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MEMOIRS

OF THE
PHILADELPHIA SOCIETY
FOR PROMOTING AGRICULTURE;

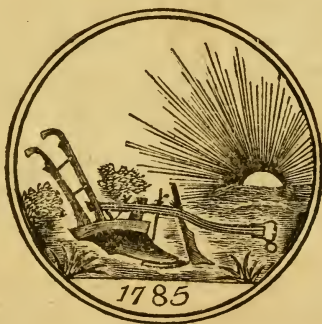
CONTAINING
COMMUNICATIONS ON VARIOUS SUBJECTS

IN
HUSBANDRY AND RURAL AFFAIRS.

VOL. IV.

“Let us cultivate the ground, that the poor, as well as the rich, may be
“filled; and happiness and peace be established throughout our borders.”

Tentanda Via est, qua nos quoque possimus tollere Humo:—



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CONTENTS.

	Page.
<i>Preface,</i>	i
<i>Alteration in the Laws,</i>	vi
<i>Officers of the Society,</i>	vii
<i>List of members elected since the publication of the last vol.</i>	viii
<i>Library,</i>	xi
<i>A Discourse on Agriculture, by Richard Peters, President, at the request of the Society,</i>	
<i>An Address on the progress of Agriculture, with hints for its improvement in the United States, by James Mease, M. D. one of the Vice-Presidents.</i>	
<i>Notices for a young Farmer, particularly one on worn lands ; &c. by Richard Peters,</i>	

CONTENTS OF THE MEMOIRS.

<i>I. T. M. Foreman, Esq. on Crawford rye,</i>	1
<i>II. Account of wire fences, by White and Hazard,</i>	3
<i>III. On Spanish peasantry, their improved lime-kilns, and economical cooking stoves, by Anthony Morris, Esq.</i>	9
<i>IV. Richard Peters's letter on hill-side and other American ploughs,</i>	13
<i>T. Jefferson and Col. Randolph on the hill-side plough,</i>	16
<i>V. J. Parker, of Kent county, Maryland ; his account of sedge-wheat ; and successful experiments by changing seed,</i>	19
<i>Note, by R. Peters,</i>	25
<i>VI. On threshing out wheat by a roller, by Nicholas Ridge- ley, Esq. of Dover, Delaware,</i>	29
<i>VII. Account of Bennett's clover and turnip sowing ma- chine, by George Logan, M. D.</i>	44
<i>VIII. Communication from James Parker, of Maryland, on disease called stunt in wheat,</i>	47

CONTENTS.

	Page.
IX. <i>Account of the Virginia cider apple, called Gloucester white, by James Mease, M. D.</i> - - - -	49
X. <i>On Smyrna wheat, by Samuel Hazard,</i> - - - -	52
XI. <i>Elastic tubes for giving relief to hoven cattle, invented by Dr. Monroe, professor of anatomy, Edinburgh,</i> -	55
XII. <i>On the cultivation of the Woad plant, by H. S. Dearborn, Esq.</i> - - - - -	57
XIII. <i>On preserving Indian Corn from frost, by Samuel Morey, of New Hampshire,</i> - - - -	63
XIV. <i>On wine, made from cider and honey, by James Parker, Esq.</i> - - - - -	65
XV. <i>Description of a steam apparatus for boiling potatoes, turnips, &c. communicated by Reuben Haines,</i> - -	68
XVI. <i>On the utility of horse rakes, by Roberts Vaux, Esq.</i>	71
XVII. <i>On the successful cultivation of wheat on the sea coast of Rhode Island, by Messrs. Greenes, communicated to Dr. Mease, by Dr. Joseph Comstock, of East Greenwich, Rhode Island,</i> - - - - -	74
XVIII. <i>Account of the means to prevent the smut and mildew of wheat, adopted with success in Flanders, by James Mease, M. D.</i> - - - - -	76
XIX. <i>Account of an uncommonly fertile soil in Lancaster county, and on trimming hedges, by Caleb Kirk, of Delaware,</i> - - - - -	82
XX. <i>On the utility of planting hops near grape vines, in preventing the destruction of the grapes by insects, by James Mease, M. D.</i> - - - - -	84
XXI. <i>Miers Fisher, Esq. on various trees,</i> - - - -	86
XXII. <i>Corn grubs, or cut worms, by R. Peters,</i> - - -	89
XXIII. <i>Effects of season on crops, by T. Semple,</i> - - -	95
XXIV. <i>On the effects of season on crops: on fall ploughing, and oyster shells as manure, by John Adlum, Esq.</i>	97
XXV. <i>On Hotchkiss's straw cutter, by R. Peters,</i> -	104
XXVI. <i>On straw cutting, and Mangel Wurtzel, by Isaac C. Jones,</i> - - - - -	107
XXVII. <i>On the same subject, by the same,</i> - - - -	112

CONTENTS.

	Page.
XXVIII. <i>The effect of the season of 1816, by general David Humphreys, of Connecticut,</i> - - -	113
XXIX. <i>On gypsum, by John Patterson, of Warren, Virg.</i>	115
XXX. <i>Richard Peters, jun. Esq. communication to Mr. Eastman, on Hotchkiss's straw cutter,</i> - - -	118
XXXI. <i>Samuel Betton, M. D. communication on sugar canes,</i> - - -	120
XXXII. <i>On Tangier wheat, by William Poole,</i> - -	122
XXXIII. <i>On the disease in wheat called stunt, by Thomas Plater, Esq.</i> - - -	125
XXXIV. <i>Observations on the summer of 1816, by Samuel L. Mitchell, M. D.</i> - - -	127
XXXV. <i>Observations on the season, and its influence and effects on vegetation, in the year 1816; beginning with those belonging to agriculture, &c. by</i> <i>of East Marlborough, Chester county, Pennsylvania,</i> -	130
XXXVI. <i>Periodical freshes every fourteen years in the Delaware, and north-east branch of the Susquehanna rivers, by S. Preston,</i> - - -	140
XXXVII. <i>On the importance of the navigation of the Delaware and Susquehanna rivers, by the same,</i> - -	145
XXXVIII. <i>Extract of a communication to the late Bernard M Mahon, of Philadelphia, deceased, on the culture, management, and uses of the Mangel Wurtzel or root of scarcity, by Mr. John Lloyd, of Ireland, steward to the bishop of Derry,</i> - - -	151
XXXIX. <i>Account of an Alderney cow, by Richard Maris,</i>	155
XL. <i>Effect of the late season, (1816,) on the growth of grain, grasses, and vegetables, in the neighbourhood of Washington, and the country above and below it, connected with the navigation of the Potomac,</i> - - -	156
XLI. <i>American Ploughs. Trials of them in England,</i>	160
XLII. <i>Robert Barclay, Esq. to R. Peters, on cole seed, tares, Mangel Wurtzel, and trials of American ploughs,</i>	162
XLIII. <i>Account of trial of Towsley's plough; and culture of corn, turnips, &c. by Abraham M. Garrigues,</i> -	165

CONTENTS.

	Page.
XLIV. <i>Double furrow plough, communicated by Mr. James Eastburn,</i>	169
XLV. <i>On muck and fresh stable manure, by E. G. Passmore, of Delaware county, Pennsylvania,</i>	172
<i>Note thereon, by R. Peters,</i>	181
XLVI. <i>Mode of cultivating Indian corn. Harrows. By R. K. Meade, of Virginia,</i>	184
XLVII. <i>Stunt and black grub, by Samuel Preston,</i>	189
XLVIII. <i>Communications in consequence of the request of the society, on the circumstances attending the season of 1816,</i>	190
<i>No. 1. By Parker Cleaveland, of Brunswick, Maine,</i>	192
<i>2. By John Gardner, of York, Pennsylvania,</i>	195
<i>Note, by R. Peters,</i>	196
<i>3. By William Poole, of Brandywine, Delaware,</i>	198
<i>4. By Joseph Gibbons, of Springfield, Delaware county,</i>	199
<i>Note by R. Peters,</i>	
<i>5. By Parke Shee, of Upper Providence, Delaware county, Pennsylvania,</i>	202
<i>6. By Henry Cox, of London Grove, (Penn.)</i>	204
<i>Note, by R. Peters,</i>	206
<i>7. By John Love, Prince William, Virginia,</i>	208
<i>8. By Richard J. Jones, of Queen Anne's county, Maryland,</i>	211
<i>Note by R. Peters,</i>	215
<i>9. By R. K. Meade, of Virginia,</i>	216
<i>10. By W. D. Bacon. Hessian fly. Tioga, Penn.</i>	219
<i>11. By James M'Fadgen, of Kennett, Chester county, Pennsylvania,</i>	220
<i>12. By William Brattle, of Pittsfield, Massachusetts. Corn Grub, its parent; and note by R. Peters,</i>	223
XLIX. <i>Entomological letter, by Thomas Say,</i>	224
L. <i>On raising Indian corn, by W. Noland, Esq. in a letter to Thomas Leiper, Esq.</i>	227
LI. <i>Wire fence; oats; Jersey manure; corn grubs; fall ploughing, &c. &c. by Richard Peters,</i>	229

CONTENTS.

	Page.
LII. <i>Hessian fly ; grain moth ; cut worms, by Thomas Say,</i>	236
LIII. <i>On the improvement of land by the use of shell-marl, by J. Singleton, of Talbot county, Maryland, - -</i>	238
LIV. <i>On reclaiming, improving, and cultivating salt marsh- es, by general John Swartwout and Brothers, - -</i>	250
LV. <i>On the same subject, by John R. Coates, Esq. -</i>	257
LVI. <i>On the culture of Mangel Wurtzel, or improved beet root, by Isaac C. Jones, - - - - -</i>	285
LVII. <i>On burning clay for manure, by James Mease, M. D. -</i>	291
LVIII. <i>Inquiries on the subjects of an address, circulated by the curators of the society, through the several counties of Pennsylvania, - - - - -</i>	305
LIX. <i>Improved Pocket Chondrometer, - - - -</i>	312
LX. <i>Weight of grain, &c. - - - -</i>	314
LXI. <i>Correction of error in "Notices for a young farmer,"</i>	316
LXII. <i>Weight and size of a superior ox, sold in the Phila- delphia market, in 1818, - - - - -</i>	317

CUTS.

I. <i>Wire fence, - - - - -</i>	6, 7
II. <i>Machine for heating irons, - - - -</i>	10, 11
III. <i>Economical Kitchen, - - - -</i>	11, 12
IV. <i>Plat of a sedged wheat field, - - - -</i>	48
V. <i>Elastic tube, for relieving hoven cattle, - -</i>	55
VI. <i>Steam apparatus, for boiling or steaming potatoes, &c. -</i>	68
VII. <i>Horse Rake, - - - - -</i>	71
VIII. <i>Triangular Harrow, - - - - -</i>	186
IX. <i>Improved common Harrow, - - - -</i>	188
X. <i>An Implement used in planting of Mangel Wurtzel,</i>	289
XI. <i>Improved Pocket Chondrometer, - - -</i>	313
XII. <i>An Ox, bred and fed in New Jersey, - - -</i>	318

PLATES.

I. <i>Hill side Plough, - - - - -</i>	16
II. <i>Bennett's Machine for sowing clover and other small seeds, - - - - -</i>	44
III. <i>Hotchkiss's Straw Cutter, - - - -</i>	104

PREFACE.

THE flattering appearances of a more general diffusion of a spirit encouraging to the friends of AGRICULTURAL IMPROVEMENT, which pervade our country, are highly gratifying to our Society, whose labours have contributed to rouse our fellow-citizens to a proper sense of its importance. We arrogate to ourselves no peculiar merit; though we look back, with great satisfaction, on our perseverance in disinterested and patriotic endeavours. The success attending such endeavours is the only reward we covet; nor do we claim exclusive praise. In other districts of our Union, similar exertions have been made, by intelligent and highly meritorious associations, to rescue from its torpid situation a subject which is of the first consequence, as it regards not only the individual happiness, subsistence and comforts of all our citizens, of whatever profession or calling they may respectively be; but as it relates to the strength, resources, and safety of our *common country*, which already exhibits a rare phenomenon in the history of nations. The PLOUGH, and not the SWORD, is the true emblem of its character. Whilst, in other divisions of our globe, conquest, and the splendour of military achievements, obtained by the sacrifice of thousands of victims to bloody and heartless ambition, afford a false glare of national greatness; *our* strength, wealth and happiness, are results produced by the enterprise, exertion, and individual industry of a most wonderfully augmented population. The *Sword* we have used, most effectively, for *defence*; and it can be wielded as effectively for *offence*, when discomfiting our foes may require it. But the *Plough-share* will more certainly and more innocently extend our power and advancement. Our territory is more than sufficient for ages of increasing population. We have only to cultivate, with intelligence and assiduity, the regions we possess; to render us incalculably prosperous and powerful. We

should not neglect the art of *war*, however greatly it is to be deprecated, in order that we may be able to repel invaders : but our leading propensities and pursuits should be those which enable us to cherish and perfect the arts of *peace*. Among these, **AGRICULTURE** is indubitably the most useful, it being the foundation and source of nutriment to all the rest. By this the solid strength of our nation, which mainly consists in a hardy, thriving, and independent yeomanry, is insured and extended. Territory without an industrious population is as unprofitable as a barren waste ; and, whatever may be its fertility, all its powers are torpid, until agricultural exertion, and intelligence in applying it, give to them activity and value. Nor will the most fertile regions be either productive or safe, if intelligent husbandry be not practised, to enable those who inhabit them to support themselves in condensed society ; and gain, in plenty and security, both subsistence and reasonable wealth, on limited and proportionably small allotments, in almost boundless wilds. As well might our new countries be still the haunts of roaming savages, as be possessed by semi-barbarous and roving hunters, or even scattered husbandmen, ignorant in their art, and exposed to every attack of ferocious beasts, and equally savage men. In our old and first settled districts, the advantages accruing from this invaluable art, are still more necessary and indispensable. The natural fertility of those countries has been hard pressed ; and, in many portions of them, it has passed away : their population rapidly diminishes, and the value of property therein is lamentably, yet not irrecoverably, decreased. Double diligence and exertion are therefore necessary to counteract the temptations, which new countries, often deceptively, hold out to fickle or enterprising occupants of worn lands. It, then, most impressively behoves the citizens of our seaboard countries to patronize every plan calculated to prevent unnecessary emigration. The sure mode is that which teaches our husbandmen to be easy and happy at home ; and, of course, supersedes the necessity of their

wandering abroad. Those who dwell in cities would be, beyond all others, the most helpless and forlorn, should the fields on which they depend for supplies be ill cultivated, or finally deserted by the tillers of the soil. Of what avail, in that deplorable predicament, would be their pecuniary wealth, gained by commerce, manufactures, and the arts which contribute to luxury, refinement, comfort, and tranquil enjoyment? As well might their coin be reduced to its original ore, and returned to the mines from which it had been drawn: or, if it could be farther used for accumulation, it must be transported to other, and perhaps precarious, scenes of speculation. Their property, now styled real, would sink into unsubstantial nothingness. Let *them*, then, of all others, be the most forward in promoting AGRICULTURAL IMPROVEMENT, by contributing liberally to the facilities of roads, internal navigation, and other means by which it is encouraged and supported.

Our Society, however inadequate their efforts may have been, have at least set an example worthy of imitation. It is composed of members engaged in almost every occupation. Although all are not practical farmers, they well know that every citizen is, either immediately or indirectly, interested in the prosperity of AGRICULTURE; and that science, as well as mechanical operation, is essential to its welfare. They have, therefore, through a long course of years, endeavoured to bring forward conviction in the public mind, that this important art should not be left, unaided, merely to those who pursue the labours of husbandry. The minds of the tillers of the soil must be enlightened, by information flowing from every appropriate source; as their corporeal powers are invigorated by the employment to which they are devoted. We flatter ourselves, that the information we have collected and disseminated, has greatly contributed to the pleasing prospect, although it be even now only in its early dawn, which presents itself in various quarters of our country. Many societies for the promotion of Agriculture are formed, and

forming. Several of our legislatures have evidenced encouraging signs of a participation in the laudable patriotism, which, more than has heretofore been witnessed, animates our citizens. Long may this cheering prospect continue to brighten; and never again may it be clouded by apathy and inattention to the most momentous of all worldly objects which should engage the anxieties of a well informed community. However great in amount be the pecuniary and other moveable and fugacious possessions of civilized men, there seems to be an inherent desire, in every individual, also to own some portion of the earth, to which, finally, he must return. Let every one, therefore, bear a part in rendering its surface a source of happiness and comfort, not only to himself, but to every member of the community with whom he enjoys its blessings. A prominent difference between savage and civilized man is, that the latter, by his skill and acquired intelligence, produces plentiful supplies from a small surface of soil, for the support of a multitudinous population: but the former requires regions of wilderness, for the scanty subsistence of a few. It is the distinguishing characteristic of savages to revolt against separate appropriations, or agricultural improvement, of land. They roam the forest, in common with the beasts devoted as their prey; and when they do not prowl for each others destruction, their fellow-tenants of the wilderness are the objects of their toilsome and exterminating amusements in the chase. Their fondness for beads, trinkets, and other baubles, is quite as rational as is the cupidity of those in civilized life, who amass money for the mere gratification of increasing their hoards; or circulate what they have, for the sole purpose of swelling the amount of their stock; without using it for promoting the most worthy of all pursuits, that of employing, instructing, and thereby eminently benefiting their fellow men. Among these pursuits, the most generally advantageous are those which encourage and promote the culture, improvement, and embellishment of a country. Gold and silver, amassed with no public object, or laudable private

benefit, are as worthless, whilst thus hoarded or avariciously turned; as the beads, trinkets, and baubles, with which savages gratify their rude and childish propensities. Such stores of useless wealth their sordid possessors *must* leave behind them; without a vestige of public-spirited employment of it, to embalm and perpetuate their memory.

Actuated by the motives which, at first, induced us to form our association, we now present to our agricultural, and *all* our fellow-citizens, our **FOURTH VOLUME OF MEMOIRS**. It is not to be expected that any thing more than unconnected, and often crude, materials for forming regular systems, or treatises, can appear in such collections. We flatter ourselves, however, that it will be found at least equal to our former publications; and receive the candid indulgence with which our preceding volumes have been treated.

L A W S.

At the annual meeting in January, 1818, the third, tenth, and sixteenth laws of the society were altered, as follows :

ARTICLE III.

The society shall have a president, and four vice-presidents.

ARTICLE X.

The stated meetings of the society shall be on the third Tuesday of every month.

ARTICLE XVI.

For the purpose of defraying the necessary expenses of the society, for premiums and prizes, books on agriculture, improved instruments of husbandry, and other important objects and contingencies, every member shall annually pay to the treasurer a contribution of *four dollars*.

If any resident member shall remove beyond the limits prescribed, he shall not, in virtue of his resident membership, be eligible as a candidate for honorary membership, without being regularly proposed as such.

OFFICERS

OF THE

PHILADELPHIA SOCIETY FOR PROMOTING AGRICULTURE.

Elected at the annual meeting, in January, 1818.

PRESIDENT.

RICHARD PETERS.

VICE-PRESIDENTS.

**WILLIAM TILGHMAN, JAMES MEASE,
GEORGE LOGAN, ROBERT COLEMAN.**

TREASURER.

EDWARD BURD.

SECRETARY.

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ASSISTANT SECRETARY.

RICHARD WISTAR, JUN.

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JAMES MEASE, JOHN VAUGHAN,
ZACCHEUS COLLINS.**

CURATORS.

**ISAAC C. JONES, RICHARD PETERS, JUN.
REUBEN HAINES, JOSEPH R. PAXSON,
STEPHEN DUNCAN.**

A LIST OF THE MEMBERS

OF THE PHILADELLPHIA SOCIETY FOR PROMOTING AGRICULTURE.

Elected since the publication of the last volume.

☞ *Those marked thus * are dead.*

RESIDENT MEMBERS.

Coleman Fisher, Philad.	Charles Massey, Philad.
*James Hamilton, do.	Emanuel Eyre, do.
Joseph R. Paxson, do.	Charles Fox, do.
Joseph Ridgway, do.	Daniel B. Smith, do.
John Miller, do.	William Walmsly, do.
John White, do.	Maurice Wurts, do.
Nicholas Biddle, do.	John E. Hall, do.
John Wister, do.	George Morrison, do.
John M. Price, do.	William L. Fisher, do.
Richard H. Bayard, do.	Edward Thompson, do.
George Murray, do.	Samuel Canby, jun. do.
Richard Wistar, jun. do.	Condry Raguett, do.
William Schlatter, do.	Edward Needles, do.
Dr. Jonas Preston, do.	David J. Davis, M. D. do.
William S. Warder, do.	Lewis Clapier, do.
Edward Shoemaker, do.	Joseph D. Brown, do.
Stephen Duncan, do.	Caleb Cresson, do.
Samuel Spackman, do.	Israel Cope, do.
Joshua Lippincott, do.	George Blight, do.
Samuel Shoemaker, do.	Charles Bird, do.
William Smith, do.	Jacob S. Waln, do.
Edward Paxson, do.	Robert M. Lewis, do.
Benjamin Johnson, do.	Richard Bache, do.
Richard C. Wood, do.	Charles Chauncey, do.
*Richard Maris, do.	James M. Broome, do.
Isaac C. Jones, do.	John Magoffin, do.

HONORARY MEMBERS.

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C. H. Wilkinson, M. D. Bath, England.
Domingas Borges de Barras, Rio de Janeiro.
M. De Lormerie, Paris.
* J. Billingsly, England.
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Thomas Smith, Tinicum, Delaware county.
Dr. Ritchie, York county, Pennsylvania.
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Mr. Bellah, Chester county, Pennsylvania.
Gen. Thomas Robinson, do. do.
Samuel Willis, York county, do.
William J. Miller, Philadelphia county.
Thomas Pinckney, Jun. South Carolina.
J. T. Lewis, do.
G. Fisher, Harrisburg, Pennsylvania.
Gen. T. M. Forman, Cecil county, Maryland.
James Parker, Head of Chester, do.
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F. A. Vandyke, M. D. Abington. do.
Thomas Miles. do.
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Mahlon Parsons, do. do.
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Samuel E. Shoemaker, Maryland.
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James Ross, Pittsburg, Pennsylvania.
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Andrew Kirkpatrick, New Brunswick, New Jersey.
David Hosack, M. D. New York.
John Yeates, Lancaster county, Pennsylvania.
Charles Miner, Chester county, do.
Abraham Sharpless, do. do.
Edward J. Stiles, Carlisle, do.
James Duncan, do. do.
Clayton Wistar, Manington, New Jersey.
George Morgan, Washington county, Pennsylvania.

LIBRARY.

FOLIO.

- Farm Account Book, consisting of Ruled Tables.
Martyn's edition of Miller's Gardener's Dictionary, 2 vols.
The Farmer's Account Book of Expenditure and Produce,
for each day, month, and year, by D. Young, Edinburgh.
Gift of James Ronaldson.
Flora Londinensis, new series, No. IV. by J. W. Hooker,
London, 1815.
Michaux on the Oaks of the United States, French.

QUARTO.

- Rules of the West Lothian Farmer's Club. Gift of James
Ronaldson.
A Volume of Memoirs and Pamphlets, on Agriculture, Bo-
tany, and Rural Economy, by M. Thouin, Professor of
Agriculture, Paris, 333 pages.
Communications to the Board of Agriculture of England,
7 vols.
Michaux on the Forest Trees of the United States, with
elegant coloured plates, (French.)
The Errors of My Age with respect to Agriculture, by M.
Cointeraux, French.
Dundonald on the Intimate Connexion of Agriculture with
Chemistry.
Farmer's Daily Journal, or Accountant.
Scott's Plates of British Prize Cattle.
Transactions of the Society for Promoting Agriculture in
Connecticut. New Haven, 1802. Gift of Samuel Hazard.
Proposals for establishing an Institution, called "The
Plough, or Joint Stock Farming Society," by Sir John
Sinclair. Gift of Dr. James Mease.

-
- Explanation of the Engravings of the most important Implements of Husbandry used in Scotland, by Andrew Gray, 1814. Gift of Samuel Patterson, Esq. Edinburgh.
- Experienced Mill Wright, with 44 engravings, by Andrew Gray, Edinburgh, 1814. Gift of do.
- Complete Course of Agriculture, by Rosier, 10 vols. (French.)
- Transactions of the Horticultural Society of London, Vol. I. part 1, and Vol. II. parts 1, 2, 3, 4.
- Nicholson's Joiner and Carpenter's Assistant.
- A volume, containing,—
- Description de l'Ecole d'Agriculture pratique du Muséum et des Exemples qu'elle Renferme,
- Description des Nouvelles Sortes de Greffes, viz. Griffe du Museum, en Arc, Buffon, à, Orangers, with plates.
- Hist. et Descript. du Coignassier de la Chine Nouvellement Introduit en Europe.
- Employ du mâchefer dans le Jardinage, par M. Jean Thouin.
- The foregoing the gift of Professor Thouin, Paris.
- Agricultural Reports to the British Board of Agriculture, 5 vols. Gift of George Clymer.
- Communications to the Bahama Agricultural Society, Nassau, New Providence, 1800.

OCTAVO.

- Lawrence's Farmer's Calendar.
- Bordley's Notes on Husbandry.
- Transactions of the Agricultural Society of New York, 3 vols. Gift of the Society.
- Marshall's Rural Economy, 14 vols.
- M'Mahon's Gardener.
- Darwin's Phytologia.
- Dr. Mease's edition of Willich's Domestic Encyclopædia. 5 vols.
- Culley on Live Stock.
- Bryant on Esculent Plants.
- Preston's Modern English Fruit Gardener.

General View of the Agriculture of the North Riding of Yorkshire, by John Tuke, 1800.

General View of the Agriculture of the West Riding of Yorkshire, by Robert Brown, London, 1799.

Monthly Register and Encyclopædian Magazine, 3 vols. London, 1802—3.

Commercial and Agricultural Magazine, by Dr. Dickson, Vols. I. II. & III.

Forsyth's Principles of Agriculture, London, 2 vols. 1804.

Letters and Papers of the Bath Society, England, Vols. X. and XI. Gift of the Society.

Agricultural Mechanism, or a Display of the Properties of Vehicles and Implements of Husbandry, with 20 copper-plates, by Captain Thomas Williamson, London, 1810.

Farmer's Companion, by R. W. Dickson, M. D. second edition, 2 vols. London, 1813.

Skellet on the Parturition of the Cow.

Veterinary Physiology and Pathology, by James Clark, Edinburgh, 1806.

The Husbandry of Three British Farmers, Bakewell, Arbutnot, and Duckett, by A. Young, London, 1811. Gift of Richard Peters.

Sir John Sinclair's Account of the System of Husbandry adopted in the more improved districts of Scotland, London, 1812. Gift of Robert Barclay, Esq. of Berry Hill.

The same, the gift of Samuel Patterson, Esq. Edinburgh.

Remarks on the Drill Husbandry, by which the advantages of that mode of cultivation are pointed out, by John Anstruther, London, 1816.

Farmer's Calendar, by A. Young.

General View of the Agriculture of Lancashire, with Observations on the Means of its Improvement, by R. W. Dickson, 1815.

White's Veterinary Medicine, 2 vols.

Forsyth on Fruit Trees, 1812.

An Epitome of Forsyth's Treatise on the Culture of Fruit Trees, by an American Farmer. Gift of J. Humphreys. Gleanings of Husbandry. Presented by J. Humphreys.

The following works are the gift of Samuel Patterson, Esq. of Edinburgh.

1. Hogg on Sheep, 1807,
2. Memoirs of the Caledonian Horticultural Society, Edinburgh, seven numbers.
3. Repertory of Arts, London, first 5 vols.
4. Farmer's Magazine of Edinburgh, from Vol. VIII. to Vol. XVIII. inclusive.
5. Catalogue of Books belonging to the Medical Society of Edinburgh.
6. Articles and Regulations for the Society of Operative Cotton Weavers, 1807.
7. Plough Wright's Assistant, by Andrew Gray, Edinburgh, 1808.
8. Tibb's Experimental Farmer, London, 1806.
9. Observation on Banks for Savings, by the Right Honourable George Rose, London, 1816.
10. Select Essays on Husbandry, Edinburgh, 1767.
11. Transactions of the Society instituted at London for the Encouragement of Arts, Manufactures, and Commerce, for 1814, Vol. XXXII.
12. Lyon on Fruit Trees.
13. Prize Essays and Transactions of the Highland Society of Scotland, 4 vols. and first part of vol. 5, Edinburgh.
14. Sir George M'Kenzie on Sheep.
15. Statistical Account of Scotland, by Sir John Sinclair, Vol. II.
16. Statistical Account, or Parochial Survey of Ireland, by Wm. Shaw Mason, Esq. 2 vols.
17. Account of an Improved Mode of raising Crops of Grain by means of a Drill Barrow, by Sir John Sinclair, 1815.
18. Sir John Sinclair on the Agriculture of the Netherlands, London.

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19. On Fiorin Grass, by J. Learmont.
20. On Edinburgh and Ruthwell Saving Banks.
21. Report of the Society for the relief of the Deaf and Dumb. On the Cultivation of the Horse Chesnut Tree, by A. Baume, Paris, 1798, (French.) Gift of N. G. Dufief.
- The following nine are the gift of Dr. James Mease :
- Two Letters to Sir John Sinclair, on Draining Wet Lands, by Dr. Anderson, Edinburgh, 1796.
- Constitution of the Merino Society of the Middle States of North America, Philadelphia, 1811.
- On the Pine Lands of Georgia, by George Sibbald, Augusta, Georgia, 1801.
- Observations on the Agriculture of the United States, by Mr. Strickland, London, 1801.
- On the Agriculture, Manufactures, and Commerce of the United States, New York, 1789.
- Essay on the Mending the Breed of Horses in America.
- Bartley's Observations on the Conversion of Pasture Lands into Tillage, and on using Potatoes in manufacturing Starch and feeding Sheep, Bath, 1802.
- On Fiorin Grass, by Dr. Richardson, London, 1810.
- Report of the Committee of the Highland Society of Scotland on Shetland Wool ; with an Appendix, by Sir John Sinclair and Dr. Anderson, on the same subject, Edinburgh, 1790.
- Marshall's Reviews of the Reports to the Board of Agriculture, London, from the East : and Middle Departments, 2 vols.
- Hunt's History of the Dishley System of Breeding Cattle.
- Elements of Agriculture, by John Naismith, London, 1807.
- Papers published by the Massachusetts Agricultural Society, 2 vols. first series. Gift of the Society.
- The American Grove, or an Alphabetical Catalogue of Forest Trees and Shrubs, natives of the United States, by Humphrey Marshall. Presented by the author.
- Retrospect of Philosophical, Mechanical, and Agricultural Discoveries, Vol. I.

Nicols's Gardener's Calendar, 1814.

A Treatise on Agricultural and Rural Affairs, by R. Brown, Edinburgh, 2 vols.

A Statistical View of the Commerce of the United States of America, its Connexion with Agriculture and Manufactures, by T. Pitkin, 1816.

Prize Essays and Transactions of the Highland Society of Scotland, by Henry Mackenzie, 4 vols. Gift of the Society.

Account of some Experiments to promote the Improvement of Fruit Trees, by peeling the bark. Gift of the author, Sir John Sinclair.

Money and Trade Considered, with a Proposal for Supplying the Nation with Money, Glasgow, 1760, by John Laws, Esq.

Young's Agricultural Survey of Essex, 1807, 2 vols.

An Essay on Draining Land by the Steam Engine, showing the number of acres that may be drained by six different sized engines, with the prime cost and actual outgoings, by W. Walker, Boston, Lincolnshire, 1812.

Annals of Agriculture, 4 first vols. and vols. 6, 15, 16, 17.

Mémoires de la Soc. D'Agriculture de Seine, 16 vols.

Mem. of same Soc. under the name of Soc. Royale D'Agriculture, 1814, 15, 16. Both presented by the Society.

Traité du Pied, considéré dans les Animaux Domestiques, par J. Girard, Paris, 1813.

Essai Theorique et Pratique sur la Ferrure, par C. Bourgelat, Paris, 1815.

Voyages d'un Naturaliste, par M. E. Descourtilz, 3 tom. Paris, 1804. Gift of J. C. Montgomery.

DUODECIMO.

Memoirs of the Lives of Benjamin Lay and Ralph Sandiford, by Roberts Vaux.

Memoir of the Life of Anthony Benezet, by Roberts Vaux. Both presented by the author.

Richard Peters on Gypsum.

H. A. S. Dearborn's Translation of Lasteyrie's Essay on the Cultivation of Woad, Boston, 1816.

Luccock on Wool, 1805.

Constitution of the Society of Practical Agriculture, near Bard's Town, Kentucky.

Regulations of the Leith Select Subscription Library.

Catalogue of the Library of the late Dr. Joseph Black, of Edinburgh. Gift of Samuel Patterson, Esquire.

The following pamphlets, in French, are the gift of the author, M. De Cubieres, of Versailles.

1. Memoir on the Ash-Leaved Maple (*acer negundo*) of the United States, Versailles, 1804.

2. On the Red Cedar (*Juniperus Virginiana*) of the United States, Versailles, 1805.

3. On the Nettle Tree, (*Celtis*) 1808.

4. On the Magnolia Auriculata.

5. On the Cypress, (*Cupressus Disticha*.)

6. On a Remarkable Marble, called Magnesian Greek, (*Grec Magnesien*.)

7. Discourse on the Advantage rendered to Agriculture by Women.

Memoir on the Utility of Hedges, by M. Bosc, Paris, 1807.

Exposition of the Plan of Operation adopted at the various Nurseries for Vines at Luxembourg, by M. Bosc. These two last presented by M. Michaux, (French.)

Summary View of the Courses of Crops in England and Maryland, by J. B. Bordley, Philadelphia, 1784. Gift of the author.

Rules, Orders, and Premiums of the Bath Society, for 1809. Gift of Dr. Parke.

Ditto, for 1812 and 1813. Gift of Dr. James Mease.

Ditto, for 1816. Gift of Sir J. Sinclair.

Cullyer's Farmer's Assistant, containing tables for finding the content of any piece of land, from dimensions taken in yards; tables showing the number of loads that will tra-

nure an acre of land, by knowing the distance of the heap ; and tables for measuring thatchers' work, fourth edition. On the State of England in December, 1816, by Sir John Sinclair.

The following are the gift of Dr. Mease :

Des Moyens de Rendre L'Art Vétérinaire plus utile, par P. Chabert et C. M. Fromage, Paris, an 13.

Rapports Faits a la Soc. d'Agriculture du Départments de la Seine, sur le Concours des Memoires de Medicine Vétérinaire pratique, par M. M. Desplas, Girard, &c. Paris, 1812.

Rapport sur le Prix Proposés pour des Observ. Pratique de Med. Vétérinaire, par M. M. Huzard, Tessier, et Girard, Paris, 1810.

Rapport sur le Prix, pour Obs. Prat. de Med. Vétérinaire, Paris, 1811.

Rapport sur les Memoires du 1812.

Rapport sur les Memoires du 1813.

Rapport sur les Memoires du 1815.

Procès Verbal de la Séance Publique Tenue à l'Ecole Royale d'Economie Rurale, et Vétérinaire de Lyon, le 10 October, 1814, pour la distribution des Prix aux élèves.

Nouvelle Organization des Ecoles Impériales d'Economie Rurale et Vétérinaire, Paris, 1813.

Règlement from les Ecoles Vétérinaires, An. 5.

The following are also in French :

Elements of the Veterinary Art. On the Materia Medica, by C. Bourgelat, 2 vols. 8vo. fourth edition, Paris, 1805.

Treatise on Sheep, by M. Chambon, 2 vols. 8vo. Paris, 1810.

Treatise on the Exterior of the Horse, by C. Bourgelat, sixth edition, with notes by J. Huzard, and plates, 8vo. Paris, 1808.

Instructions on Sheep, and particularly Merinos, by M. Tessier, Paris, 1810.

Treatise on Building, en Pisé, by François Cointeraux, Paris, 1790. Gift of M. De Lormerie.

Memoir on a Cabbage that can be mowed. Choce a faucher, by the Abbe Commerel, Paris, 1789. Gift of ditto.

On the Culture of Rice in France, by M. Lasteyrie. Gift of the author.

Report to the Agricultural Society, Paris, on M. Michaux's Voyages to the United States, Paris, 1809. Gift of Mr. Michaux.

List of the Members of the Agricultural Society of the Department of the Seine, for 1809. Gift of the Society.

The following French pamphlets are the gift of Dr. Mease: Memoir on Furze, Whin, or Gorze, L'Ajone, (*Ulex Europæus, Lin.*) by M. Colvel, Paris, 1809.

Treatise on the Management of Forests and Woods, by M. Dralet, Paris, 1807.

Memoir on a Disease that affected the Milch Cows of Paris and its vicinity, year 8th.

On Sheep, by the Marquis De G——, Paris, 1788.

On Merino Sheep, by F. H. Gilbert, Paris, year 7th.

Report to the Agricultural Society, Paris, on the Improvement of Agriculture in the Department of High Alps, (*des Hautes Alpes*) by M. Pettit, Paris, 1810.

On the Farming of Baron Flotbeck, and on the Cultivation of Chicory, at Brunswick, (Germany) by M. Brunn Neergard, Paris, 1808.

Manual of Practical Agriculture, by the Senator M. the Count de Pere.

Some Facts on Merinos, by C. Pictet.

The following are the gift of John Vaughan :

Observations on the Sowing of Spring Wheat, published by order of the Dublin Society, Dublin, 1807.

Essay on the Construction of Ice Houses, and a Description of a Refrigerator, (for the preservation of butter or meat) by Thomas Moore, Baltimore, 1804.

The Great Error of American Agriculture Exposed, and Hints for Improvement suggested, by Thomas Moore, Baltimore, 1801.

Treatise on Practical Farmers, and on the Use of Plaster of Paris, Deep Ploughing, &c. by John Binns, of Loudon county, Virginia, Frederick Town, Maryland, 1803.

Papers published by the Massachusetts Society for Promoting Agriculture, 2 numbers, 1796, 1804. Gift of F. Nichols.

Virgil's Pastorals and Georgics, translated into English prose, with Notes and Reflections, by James Hamilton, Edinburgh, 1742. Gift of S. Patterson, Esq. Edinburgh.

Bakewell on Wool. Gift of Solomon W. Conrad.

An Essay on the Utility of Soap Ashes as a Manure, London, 1812. Gift of Dr. James Mease.

Resolutions of the General Meeting of Subscribers to the Edinburgh and Glasgow Canal, 1815.

Directions for the Transplanting and Management of Young Thorns, or other Hedge Plants, by Thomas Main. Gift of Dr. James Mease.

Smith's Map of the different Strata of England, Wales, and Scotland. Gift of Robert Barclay, Esq. England.

The Society are collecting specimens of native manures : and also working models of useful agricultural implements, as far as their limited funds will permit. They will cheerfully receive models of all improved or patented implements from the Proprietors.

ERRATUM.

Page 121, for 10*l.* read 10*s.*

A DISCOURSE
ON
AGRICULTURE.

ITS ANTIQUITY; AND IMPORTANCE TO EVERY
MEMBER OF THE COMMUNITY:

THE OBLIGATIONS

ALL ARE UNDER TO ENCOURAGE IT;—

AND THE

NECESSITY OF DIFFUSING A KNOWLEDGE
OF ITS PRINCIPLES, AND SYSTEMATICAL PRACTICE,
AS THE FIRST STEP TOWARDS ITS
ADVANCEMENT.

DELIVERED BEFORE

THE PHILADELPHIA SOCIETY FOR PROMOTING AGRICULTURE;

AT THEIR REQUEST,

On their Annual Meeting, the 9th of January, 1816.

BY RICHARD PETERS,
THEIR PRESIDENT.

At a meeting of the "Philadelphia Society for promoting Agriculture," held 11th mo. (November) 14th, 1815, it was, "Resolved that the President be requested to prepare a discourse on the progress of Agricultural improvements in the United States, and on the causes that have contributed thereto, with hints for its further advancement."

At the annual meeting of the Society, convened on January (1st mo.) 9th, 1816, the President delivered a "Discourse on Agriculture," after which, (the Vice-President, Chief Justice Tilghman, in the chair,) it was, on motion of Miers Fisher, "Resolved unanimously, that the thanks of the Society be presented to the President, for his able and interesting discourse this evening delivered, and that he be requested to furnish a copy of it, for publication."

Extracted from the Minutes.

ROBERTS VAUX, Sec'ry.

A DISCOURSE ON AGRICULTURE.

IT is more to evidence my disposition to use every endeavour to show the importance of the subject of our institution, and the necessity of rousing the public attention to its advancement, than from any consciousness, I feel, of a capacity to gratify the wishes of the society, that I address to it some of my own, and recitals of the sentiments of others, on a topic, on which it is difficult to say any thing new.

HUSBANDRY has been practiced, from the earliest times, more as an *art* than a *science*. Most writers on the subject, are like the collectors of family recipes—good for specific cases.—But no regard is had to the consequences of administering them, as they relate to the general state of the system; or how they affect the future vigour and welfare of the patient. The combination of science with practice, is, relatively, of modern discovery and developement. From the days of the patriarchs to our own, agriculture has been followed with very little attention to its principles. At least, none have been transmitted to us, originating in remote antiquity. These are now only in their earliest stage of progress; and by no means settled, or extensively regarded. Yet a commencement (highly honourable to those who have begun the course of inquiry, philosophical and experimental,) has been made, with every promise of the most important success. There is enough already achieved, to excite the zeal, and to reward the labours of those, who would pursue the discoveries, and practice on the principles displayed by both practical and theoretical writers, on a subject, which, from the earliest ages to this day, has been ever considered the basis of the comforts and prosperity of the human race.

When our first parents had offended, and were, in consequence, exiled from that happy region, which spontaneously furnished every innocent and necessary enjoyment, it was decreed, that all mankind, of whom *Adam* was the prototype, should “*eat bread in the sweat of their faces;*” that is, they should procure the staff of life by *labour*. To this end, “the ground was *cursed;*” that is, it was doomed to throw up unto *Adam* and his descendants, “*thorns and thistles:*” to the intent, that *labour* should be indispensable, to render the earth capable of “bringing forth its increase;” and to conquer the obstacles placed in their way, before they could “*eat bread;*” instead of “*the herb of the field,*” which was the food, our offended Maker had then prescribed to fallen man. Although one of those *curses*, which were inflicted for our ultimate benefit, by our all wise Creator, who has made nothing in vain, has been turned into a blessing, by its being employed to protect the fields, to which the labour of man and the “sweat of his face” have been applied; and the other, or some of its variety of species, has been by human ingenuity converted to the most important purposes, not only as esculents but in the arts; yet those “*curses*” still remain, in proof of the divine displeasure, and require constant exertion to subdue them. So that human *labour*, is not only indispensable in the preparation of the ground for the first stages of culture, but is incessantly necessary in all the subsequent processes of husbandry, in which “*thorns and thistles*” (the types under which all *weeds* and *pests* are intended to be described) must be objects of constant hostility, and must be eradicated before profitable vegetation can be expected. Thus do we find, that the destruction of weeds and pests, is rendered necessary by a divine injunction, because it is a prerequisite, before we can “*eat bread.*” The first principle of practical husbandry is thus inculcated. *A good farmer must suffer nothing to grow, but his crop.* He must therefore use ceaseless endeavours to extirpate weeds and pests.

However small may be the attention to this salutary maxim, it is the foundation of all profitable operations in husband-

ry--the test of character in the agriculturist;--and should be the pride and boast of all respectable husbandmen,

One being asked, "what was the best manure?" replied, "animal sweat;" meaning tillage, industry and intelligent and repeated culture. All these are hostile to weeds and pests, and are certain modes of destroying them. I mention, in my outset, these impediments in practice, because *we* have *mental* weeds and pests, to wit, ignorance, apathy, obstinacy, and prejudice, to subdue, before we can reap any fruits from our labours, to advance the interests of husbandmen, by suggesting improvements in their art.

The beneficent author of our existence, always tempers his justice with benevolence and mercy. He has enjoined labour and persevering industry on the cultivators of the earth, not only as a penalty on human disobedience, but as the most sure preservatives of health; and the safest means of insuring happiness, innocence and comfort. To the industrious husbandman, labour is a blessing; and the results flowing from it are inestimable rewards. His constant occupation either softens, or prevents, the misfortunes inseparable from our nature. It brings along with it, contentment with moderate gains, unknown to the possessors of superabundant wealth; and secures him from the seductions to which integrity is exposed; when men thirst after riches, without labouring for their acquirement. His employment is placed in a scene, for the most part, removed from the speculations of the idle and the visionary. Whilst he obeys the divine injunction, "*to eat his bread in the sweat of his face,*" his efforts of obedience give him health and vigour to enjoy it. Yet, although his corporeal powers are thus strengthened, he remains deficient in mental acquirements.

This is not intended as a mere declamatory personal eulogy on those devoted to the practice of husbandry, the employment of the immediate descendants from our first parents. It is meant to shew the claims, which the yet defective *art* is entitled to establish, on the possessors of wealth and power; and more especially on those who enjoy, without corporeal exertions, that is, who do not "*eat their bread in the sweat of their*

faces," the indispensable support derived from the labours of the husbandman. *Science, talent*, and every mental acquirement, should be liberally bestowed, when instruction is required, as it always has been, by the tillers of the earth ; whose occupation, in a great degree, secludes them from opportunities of gaining scientific knowledge and a capacity for philosophic research. AGRICULTURE having been not only the first of arts in priority of time, but the first in the estimation of the wisest and greatest men of every age ; should ever be deemed the first object, both of public and private attention. *Power*, especially that delegated by the people, should extend its arm, and open its hand, for its aid and protection. *Wealth* should unlock its coffers for its encouragement ; and *genius* and *science* should lavish their almost magical stores for its instruction. *Commerce* should yield to its support, a share of those profits whereof it is the source ; and *manufactures* should bestow a willing tribute to the art, on which their existence depends. Those who devote themselves to the *learned professions*, should render to it both homage and contribution. *Their* usefulness or gains would be small indeed, among shepherds and hunters ; and those were, for the most part, the employments of man, before agriculture widely diffused its blessings, and mainly contributed, not only to the civilization, but to the happiness, wealth, subsistence and safety of our race. Those who minister *at the altars* ; and are our instructors and examples in our most exalted concerns ; are, also, bound to animate, instruct, and encourage the cultivators of the soil. Many of them in other countries have been highly meritorious, both in precept and example, on this subject. And *they* peculiarly know, that the exercise of this art is venerable for its antiquity, was enjoined by a dispensation of providence, and established by an ordinance of heaven. It was followed by our first parent and taught to his children. His first born, *Cain*, incurred the divine displeasure, and laid the foundation of his posterior crime, as some commentators assert, by offering on the altar, grudgingly and impiously, the mean products of his fields.—An awful and warning lesson this, to bad and narrow-minded farmers ! NOAH select-

ed and saved from the almost universal destruction of our race, was a HUSBANDMAN ; destined to repeople the earth ; and to practice and diffuse his invaluable and all essential art, as one the most necessary to the support and prosperity of the succeeding inhabitants of the renovated world.

On *us*, whose happy lot is cast in a FREE COUNTRY, the extension and encouragement of *agricultural improvement*, is most impressively incumbent. *Montesquieu* has, with truth, observed, that “countries are not cultivated in proportion to their *fertility*, but to their LIBERTY.” The ATHENIANS, among the first of the *Greeks* who acquired a free government and the polish of civilization and science, were famed for their knowledge in AGRICULTURE. But alas ; *their* country, which still continues to be scourged by ruthless *despotism*, brought on at first by their abuse of liberty, in place of smiling in its once exuberant plenty, now weeps over its long lost prosperity. Its dreary deserts still contain the ruins of its former splendor ; which remain, not only mouldering monuments for painful reflection and salutary instruction to *all* people, but solemn warnings to *us*, who have evidenced some strong similitudes of private character and public propensities ; whilst we possess the rich pearl, which they had wantonly and licentiously thrown away ! Their freedom has passed from them ; and their agriculture along with it.

XENOPHON, a distinguished *Athenian*, a great captain and celebrated historian, who traversed vast regions of the old world, and led the Grecian armies, in, to *them* a ruinous, but to *him*, *personally*, a highly honourable, foreign war, has many ages ago remarked that “AGRICULTURE is the nursing mother of the arts. For, where it succeeds prosperously, there the arts thrive ; but where the earth necessarily lies uncultivated, there the other arts are extinct.”*

In the early periods of the *Roman Republic*, when *liberty* was a substantial blessing, and not an empty sound ; the highest praise that could be given to any citizen, was, to say

* See Bath Society papers—out of which I have taken some thoughts and facts.

of him, “that he had well cultivated his spot of ground.” The leading propensities of her greatest men, were to cast off their robes of state, and lay aside their truncheons and ensigns of power, to “cultivate their spots of ground.” And, in some instances, when absent on high commands, or important public duties, their little farms were cultivated at public expense. But if the illustriously didactic VIRGIL, could now revisit the neighbourhood of *Rome*, and many parts of the scenes of his still unrivalled *GEORGICS*, which were composed at the instance of the crafty minister of *Octavius Cesar*, pompously styled *AUGUSTUS*, who patronized *them*, to repair and make some amends for the waste and misery, *he* had mainly himself occasioned; the feeling poet might again exclaim, as he did, in the character of *Melibæus*, in his first eclogue;

“Impius hæc tam culta Novalia Miles habebit?
Barbarus has Segetes? en quo Discordia cives
Perduxit miseros! en queis consevimus Agros!”*

With no small degree of anguish he would perceive, that he had written his yet justly admired agricultural lessons in vain. The long and unprecedented ravages, with which *Europe* has been afflicted in our day, verify the remark of *Montesquieu*. In extensive regions of that quarter of the globe, *Agriculture* has been either suspended or languishing. Where-soever it had any activity, its scanty products have been consumed, or trodden down by unrelenting and heartless spoilers. The modern competitors for power, how far soever necessity and self-preservation might justify most of them, and one, beyond all the rest, in desolating ambition: have shewn themselves as perfect masters in the works of destruction, as their examples, the ambitious, remorseless and sanguinary *CÆSARS* of antiquity; though, one excepted, they may not copy them in personal flagitiousness.

* Shall an impious soldier possess these well tilled fallows? A barbarian these crops? Behold the abyss, into which dissension has plunged our miserable citizens! Lo, for whom, we have sown our corn-fields!

Modern times fully display the truth of ancient positions. In *European* countries enjoying the greatest share of freedom; in that particularly from whence our ancestors emigrated, and brought with them many of our best principles of liberty and law; agriculture is in a high state of perfection. And it is fortunate for the people of that country, that such is their knowledge in this art, that they are enabled to substitute other esculents in place of *wheat*, or, as they term it *corn*, both for men and domestic animals. For it appears, that owing to ceaseless wars, over-manufacturing, tithes, poor-rates and difficulties in obtaining the right to enclose and cultivate their wastes and commons, they had, in twelve years precedent to 1814, necessarily imported 700,000 quarters of *wheat*, annually; valued, for the twelve years, at 30,000,000 of pounds sterling, for their own consumption. What additions to their importations have since occurred, I have not recently examined. To encourage their agriculturists, at the expense of the consumers, they are now compelled to enact restrictive laws, regulating the *import*; having by precedent laws regulated the export of corn. Whether these are salutary, or not, great differences of opinion exist among them. Such laws do not often reach, but generally defeat their own objects; and, by recent accounts, it appears, that the British corn laws verify this observation. *Buonaparte*, who aimed at a lead in every thing, destroyed his project for filling *France* with *Merino* sheep, by forbidding their exportation; whilst no such prohibition is there imposed on agricultural products.*

France also exhibits an additional instance, that even partial freedom and agricultural prosperity go hand in hand. For although she has been, by wicked and visionary political em-

* A restriction upon the exportation of corn, after it rises to 29 shillings (British sterling) per quarter, has lately been established in *France*. The policy of this measure is yet to be tested. It is agreed, even by advocates for restrictions, that free interchanges would be best. But temporary circumstances, and fears of dependence on each other, have introduced restrictions, in countries which for ages past have been jealous and conflicting rivals. National jealousy is bloodless warfare.

piries and military tyranny, scourged and flayed, her agriculture has flourished ; since, in consequence of her revolution, that property has become generally divided which had been accumulated in the hands of the crown, the great lords and the church. The people have become proprietors ; are released from the feudal services and tenures ; and have been encouraged and permitted freely to follow their agricultural occupations. Nor, until their late catastrophe, had their soil been trodden by hostile feet during a long period.

SPAIN continues to exhibit a melancholy proof, that autocracy and agriculture cannot cordially exist together. The plough has long been almost idle, in that country. Cursed by the productions of her American mines (as a punishment for the crimes by which they were acquired) she has, for an age, neglected to cultivate her fertile soil, with activity and agricultural intelligence ; depending on the precious metals, instead of the more precious produce of the fields. Indolence, poverty, ignorance and its attendant bigotry, have been the lamentable consequences, among the great mass of a population capable of wonderful exertions and gallant exploits, when honestly and wisely directed. Her “beloved” Ferdinand has gained no wisdom by misfortune. He has restored all the deleterious and sordid corruptions of her old government ; which has relapsed into the darkness of the middle ages. All her bright prospects have vanished. Her splendid achievements, which of late dazzled and delighted us, have passed away like gaudy and glowing meteors corruscating o’er the bosom of night ; and have served only to render her darkness more horribly visible. If, in the course of uncontrollable events, her foreign Treasurers should be taken from her ; industry, forced by necessity, would create more permanent and beneficial resources. Her deserts and trackless wastes, now the frequent haunts of a daring banditti, would smile with cheerful labour and exuberant plenty. Her wandering shepherds and starving cultivators of the vine and the olive, would seize the plough, as the implement which would cause general wealth and exhaustless abundance to rise from the surface of the earth ; in place of fascinating but fugacious treasure, obtained

by slavishly digging into its bowels, to enrich the few to the privation and misery of the many. But to effectuate a change so salutary and desirable, the people must possess a due share in the government; liberty must shed her benign influence on the labours of the husbandman; and her rulers must, and most probably will, encourage and cultivate the arts of peace.

Read the accounts of modern travellers; and you find, that many of the most fertile regions of the old world, in some whereof the cultivation was even renowned, are now gloomy wastes, either scantily peopled by semi-barbarians, or by an oppressed and often starving multitude, groaning under the griping hands of DESPOTISM. Is it not, then, most bitterly to be lamented, that so few among ourselves are impressed with convictions of these momentous truths. Insomuch, that they leave an art, so important to the interests of the *whole*, to the individual exertions of its professors, without that encouragement, protection and instruction which *all* should afford! If men of reading and historical knowledge should say, “the facts are known to us and credited;” I invitingly reply—“shew me thy faith by thy works.” Assist in making the subject popular, bring it into fashion, and the work is half completed. It is no small consolation, that there are honourable and highly meritorious exceptions. It should continue to be *our* ardent wish, as it has been our humble endeavour, that these exceptions should multiply, until the improvement of our agriculture shall become as extensive and imperishable, as the freedom and happiness of our country, to the “*esto perpetua*” whereof, nothing can so essentially contribute; it being, most indubitably, the base on which that freedom and happiness are founded. One would imagine, then, that every *Patriot*, be his profession or employment what it may, would feel an interest beyond any other, in promoting the prosperity of this universally important art. If the liberty of our country be so connected with it, that, as all history and experience show, it is the test of its stability; furnishing in *war* the supplies indispensable for defence, in *peace* the materials for subsistence, comfort and wealth, what further inducements can there be? And,

after all, a very moderate contribution of either time, pecuniary assistance, or personal attention is required from any individuals.

Sober and well regulated freedom is the “nursing mother” of agriculture; and it amply performs its filial duties. Licentiousness and anarchy are its bane; because in such a state of things property and person are insecure; and *Despotism*, the inevitable consequence of wild and licentious freedom, convert, by its ravages and oppressions, the fairest portions of our globe into deserts, cheerless and sterile. *Love of country*, in which we are not deficient, when our convictions of the necessity of exertions are roused, should, therefore, impel us to promote every means for the avoidance of a catastrophe so horrid and deplorable, if even the danger should now appear to be very remote.

True it is, that *agriculture* has been known to the most arbitrary monarchs, to be the foundation of all the means they had, for the support of their population; too frequently made the instruments of conquest, ambition, voluptuousness and splendour; and it has been fostered, occasionally or permanently, by arbitrary princes, wise enough to see its importance. But the tillers of the earth had no weight in the government, or control over their rulers. They did not enjoy, or dream of personal independence, or the acquisition of property, which, with any certainty or stability, they could call their own. No system, or durable improvement could exist among them. They were the slaves, either of the monarch, or his satellites, the great lords, and both their persons and the fruits of their labour were stamped with the indelible marks of bondage, “*Sic vos non vobis !*”* The civilization of modern times has, indeed, produced more liberal views of policy in governments in which the physical power of the people is either dreaded, or necessarily depended upon; and a portion (small enough) of emancipation, both of person and property, has been granted freely, or yielded reluctantly. But still the weight of their shacklets precludes those improvements in the

* Thus do you labour for others ;—not for yourselves.

art, which insure the comforts and wealth of its professors ; whilst they guard and cherish the freedom and happiness of a country, blessed with unassailable LIBERTY protected by its most impregnable rampart, wise, impartial, and purely administered LAW.

It is not to be understood, that the aid required for the ART, is intended for the mere personal emolument of the *farmer*. Those who take an incorrect view of the subject allege, that “farmers are doing well enough, and want no assistance.” Every one acquainted with political economy, knows well, how extensively it adds to the general advantage of the community, when the same portion of labour is made to produce an increased number and quantity of supplies. And, eminently distinct from all other employments, that of the husbandman brings into existence, by a kind of creation, additions to the public stock drawn from the earth. Whereas most, if not all, other occupations are employed on materials pre-existing. FARMERS are truly called by the best writers on political economy, “the productive class ;” whilst all others are justly styled, “the unproductive classes” of the community.

It is not exclusively necessary to cite opinions, or proofs, from great authorities, that whilst able and intelligent farmers enlarge the mass of property and wealth in the society in which they live, they also increase the public *security* and happiness. It will be seen at once, by every one who passes through a country productively and neatly cultivated, that quietude, contentment, morals and exemplary submission to law and good-government, are strikingly conspicuous. But in a district inhabited by a negligent, indolent and ignorant population, the picture is disgustingly and even dangerously reversed. So that it behoves every good citizen, for *his own security*, as well as from motives of patriotism and moral obligation, to assist in furnishing the means of warning the negligent, stimulating the indolent, and enlightening the ignorant husbandman.

I have been requested to discuss the subject of “AGRICULTURE and its improvement in the United States.”

This would, indeed, open a wide field. I have not sufficient materials for the task. Nor have I been able, since the request was made to arrange the few I possess, or to obtain a supply of numberless deficiencies. It is not, therefore, my intention, because it is beyond my power, to undertake so extensive a topic. If, as was long ago recommended by the venerable father of our country, a national arrangement, either attached to a national seminary, or, as in *England* a board of agriculture, in *France*, a national institute, with a branch devoted to husbandry, and, as in all countries, regardful of this all important subject, some national, or state plan had been adopted and established, such materials would ere now have been at hand. Geological, agricultural and statistical inquiries would have been promoted and made, essential not only to the agriculturist, but to those who hold our political helm. They would be furnished with the means of forming correct opinions of the resources of our country, various in its climate, soil, products and local capacities. Errors in financial calculations would be avoided, and the prosperity of the whole advanced. Whatever good or bad practices existed, would be promulgated to the cultivators of the soil ; so that they could have been enabled to profit by the one, and sedulously to avoid the other. Native manures and all auxiliaries to husbandry, would have been discovered ; and their localities and uses would have been known. And yet, with all the information we could obtain, the result would be imperfect. It would enable one more intelligent than I profess to be, to give but a rude outline of a truncated pyramid, built on a foundation, in many portions of it, unsound, and, with some exceptions, rough in its structure, with little ornament in its parts ; and still requiring immense supplies, both of knowledge, materials and workmanship, before it can be completed. We could exhibit the primæval spectacle of man in his hunter state ; and trace his progress to a wonderful degree of civilization and improvement. No quarter of the globe, can furnish such lessons for enterprize, successful industry and countless wealth, taught in our happy country, (if we always more intimately felt its blessings) in the comparatively short period, in which we have

extended the prosperity and enjoyments of our race ; whether as colonists emigrating to a wilderness, or as citizens of an independent nation, rapidly advancing to an equality with those who have had the advantages of long experience, accumulating through ages, to perfect their political, agricultural, commercial and manufacturing systems. All these are a family of national relatives, whose fraternity should never be disturbed, or distracted. Not one of them can receive a wound, without its being sympathetically and poignantly felt by the whole. But such has been the state of the civilized world, that each has had its turn of depression, during the eventful period in which we have lived ; and it is therefore the more difficult, at this moment, to establish any certain *data*, from whence to draw sound and justifiable conclusions. We have just emerged from a participation in the disasters with which the world has been lacerated. Yet we already exhibit an elevation so buoyant and elastic, that did we not know what has passed, we should with difficulty believe that pressure and distress had existed. The AGRICULTURE of our country, including both *tillage* and *pasturage*, which *Sully* calls “ the two *breasts* of the state,” and by which I mean the art of bringing forth from the earth, products of every species and description, in every district of our country, must have been powerful and efficient in the aggregate, to enable its professors to lay up materials for *commerce* and *manufactures*, so abundant, that no lack of them was experienced, when our ships again whitened the ocean with their sails, which had been most lamentably long unbent. Even in the short period since our emancipation from the difficulties, dangers and impediments, with which *war* and the circumstances preceding it had embarrassed us, our products are in plenty ; and the mass of husbandry has been encouraging, although in its details it may be found deficient and objectionable.—If so much can be done, without the assistance afforded by science, system and principle ; how much more could have been accomplished, with the same physical and mechanical means, directed by intelligence and agricultural information ? Renovating worn lands has this inestimable consequence ; it multiplies products, in a degree su-

perior in quantity and advantage to those on lands newly reclaimed from our forests, and supersedes the necessity of migrating to the wilderness. Hence, the population remains condensed ; instead of being scattered, and debilitated by the absence of those who wander from old settlements and “ the busy haunts of men,” to begin a new and toilsome career in our unsubdued wastes. A propensity to wander for hunting, or pasturage, has, from the earliest times, been a proof of ignorance in agriculture, and a test of bad husbandry. The nations of old who inhabited the country wherein agriculture originated, were celebrated for intelligence in this art. Whilst others led an erratic life, they remained stationary, enjoying, in fulness and plenty, the products of their well cultivated fields ; and some of them were as remarkable for scientific, (so far as we know of the science of those remote ages,) as for agricultural knowledge.

No dread of superabundant plenty need to alarm us. For if we can raise double the quantity of an article at the same expense, we can undersell those less happily situated. If this be done near markets and places of ready sale and export, our profits are still the greater ; and our commerce and manufactures would flourish in proportion to the cheapness and plenty of our products. The skilful cultivators of lands in the vicinity of such marts, would, evidently, be the most benefited by improvement in their art.

Our taxes are so comparatively small (however we may complain of a temporary increase of them) and our public burthens, in contrast with European imposts, so light ; that no European people could, if our agricultural systems and intelligence were more perfect, compete with us. *England* is prominently powerful, and, though not free from great difficulties and depressions, prosperous ; with a heavier load of debt and taxation than, I believe, any other nation. Her debt exceeds 800,000,000 of pounds sterling ; whilst ours is stated to be about 120,000,000 of dollars, being short of one year’s interest of the British national debt. Her taxes (*direct* and in addition to those on consumption) in 1814, were such, that, according to Birbeck, (appendix to notes, pages 18, 19,) an

annual income from landed estate in *England* of 441*l.* 13*s.* after paying all direct taxes, will nett only 184*l.* 10*s.* Of these taxes, or burthens, the *tithe* and *poor rate* are 180*l.* ! In *France*, all taxes (I presume direct taxes) paid, the same amount of income would nett 375*l.* The otherwise insatiable *autocrat* of the French people, spared, to keep them in quiet, their fields and their purses ; whilst he exhausted their population. He fed *their* national pride with *his* all-consuming *glory* ; whilst he and his myrmidons fattened on the spoils of other nations. Nor did we escape his indiscriminating grasp. True, the agriculture of *England* is, in consequence of them, *depressed* ; but *ours* would entirely *sink* under no very great portion of such burthens. Her population, including her European dominions, scarcely doubles our own. Our resources are wonderfully fruitful, and our territory various and extensive. And we have, perhaps, too little difficulty in thinning the ranks of our population by settling our waste lands ; whilst she meets with obstacles, almost insuperable, in bringing into profit her common and wastes ; important to her, trifling when compared with ours. Yet those commons and wastes amount to 6,300,000 acres in *England* alone, (nearly a seventh part of the whole area of that kingdom,) and the greater part of them are capable of high cultivation. But it so happens in human affairs, that apparent benefits often produce opposite consequences. Our boundless territory of waste lands operates, frequently, as a bar to the improvement of our old settlements, by affording a new and seductive scene to the occupants of exhausted lands. Our forests are the soonest brought into culture by our own people ; and they, in great numbers, through fickleness and want of intelligence in agriculture, prefer migrating, to renovating their old, and *locally* more valuable, lands. *Europeans* (with a few valuable exceptions) do not succeed in our new settlements. And we have been generally disappointed in our expectations from them, of profitably increasing our agricultural population, however estimable many of them may be in other employments. So that the swarms for migration must abandon our old hives. And in your volumes there are lessons for *them*.

With the superior advantages we enjoy over older nations, to increase both our means and our population, we have every thing to hope, and nothing to fear, but disunion and anarchy, which are no more to be apprehended, than are the vicissitudes to which all other nations are liable. No *church dues*, or overwhelming *poor-rates, tentures, or services* load our industry and labour. *Leases*, and their long or short duration, do not stand in our way. *Proprietors* of the soil we inhabit, we have only to be *docile*, and learn the best modes of cultivation. All our exertions enure to the benefit of ourselves and our descendants. And although it may be attended with some delay to the progress of improvement, that our farmers can live well with indifferent husbandry; and thus *necessity* seldom stimulates invention, or exertion, as it does in European countries; yet long may this incentive be averted! Other excitements urge us on to agricultural improvement. A propensity for plentiful enjoyment prevails with most; and they, with common industry and a moderate share of intelligence, will be gratified. Hopes of wealth, and its attendant distinction, in a country wherein there are no orders, or classes in society, superior in degree, will animate others. But to attain *their* object, it behoves *them* to promote every measure calculated to advance our agriculture to its highest state of perfection, if they wish to acquire even a reasonable and moderate share of riches. Let it, then, be the joint endeavour of all our agricultural fellow citizens, be their views and wishes moderate or extensive, so to pursue, encourage and improve their art, that when the facts, which are necessary to form a just opinion, are collected, they may prove highly beneficial to themselves, and both honourable and profitable to their country! Yet, whensoever these facts appear, however, in particular instances, they may be meritorious, and, in the aggregate, encouraging; I much fear, that they will exhibit, in the details, numerous and disgusting proofs of ignorance in principles, deficiencies in practice, squalidity in appearance of foul fields and crops, misapplication of labour and means, indolence and imbecility, requiring all the aid, which all the friends to, and promoters of, the art of good husbandry, can bestow!

I have mentioned the disadvantages, with which one of the best cultivated countries in Europe has to struggle, neither invidiously, nor vauntingly. My intention is to show, that sound principles and good practice will bear up against all impediments. And I have contrasted our situation with theirs, with no other view, than to animate us, who do not labour under similar difficulties and burthens. Nothing is wanted to enable us to profit by the fortunate circumstances in which we are placed, but *a general conviction* of the magnitude of the subject, and *the will* to take advantage of them. Although the British government has wisely established a most respectable board of agriculture, the great landholders do not call on *Hercules*, without putting their own shoulders to the wheel. Their agricultural improvements have been chiefly accomplished by private exertion. True, we cannot compete with the expenses unsparingly incurred, by their nobility, gentry and some of their clergy, who withhold neither money nor pains to attain their objects. But when our people, and those who represent them, are convinced of the necessity of measures for the advancement of our agriculture, the capabilities and enterprise of the American character, will achieve all that could be wished on the subject.

My observations on the general subject, will not apply to all the branches of it. They chiefly relate to those districts of our country, cultivated by a *white* population. From all I have heard, or know, of those parts of the United States wherein the labourers are *coloured*, the *sic vos non sobis* is strongly marked, and the want of agricultural knowledge (forming *our* judgment from *their* practice) either of system or principle is the most conspicuous. Of course, all that has been said of the necessity of falling on some means to spread this kind of information, would be to *them* most highly beneficial. That the proprietors of the soil of those countries, should have left this subject so long in a state of almost total neglect and inattention, has always been to me, not only a source of poignant regret, but of utter astonishment. No landholders of our country exceed, and a great proportion do

not equal them, in acuteness of natural talent, education and mental acquirements. From them I should have expected lessons of improvement. To them I would not presume to read them. Yet, contented to receive an aggregate of product from large possessions, great in amount, they have, with some exceptions, suffered the details of cultivation to remain without change or amelioration, from generation to generation. And, in fact, it appears to have been, (according to the evidence of "*Arator*," written by a distinguished citizen of *Virginia*) a system of exhaustion and impoverishment, instead of one of renovation and improvement. Knowing well, as they do, how to enjoy the comforts and elegancies of living, one would presume they would gladly join in any plans to improve an ART, which to them is peculiarly necessary, to increase their own means, as well as to benefit their country. They have an ascendancy in our public councils, and direct, in a great degree, our national concerns. It is therefore peculiarly incumbent on them, to forward all measures, wherein national aid is required, on a subject of most importance to them, but highly momentous to us all. Among all those called "standing committees," either in the national or state legislatures, we have never seen one on AGRICULTURE, nor any appropriation of monies for its direct encouragement. This would appear to show, either an unfortunate conviction that none were necessary, or an insensibility to the magnitude of the subject. Yet, at some periods of our affairs, I have thought farmers had reason to be satisfied with the omission. Because such a committee might (under the plea of necessity) have been employed in other considerations than those which produce results deemed encouraging. So that, negatively, we have derived (save in one impost) some advantage by the "*laissez nous faire*,"—"let us alone." Now, (without presuming to dictate,) it would seem, that some attention to this, among other arts of peace, should be expected; because it is the root from which they all spring. I do not mention these circumstances reproachfully, but with sincere regret. I shall be happy to receive any information, more agreeable, to correct my errors. Nor should I have brought before the socie-

ty my views of southern farming, had I not deemed it a duty to comply with their request, so far as I could.

I am requested to develop “the causes that have contributed to the improvement of the agriculture of the United States, and to furnish *hints* for its further advancement.”

I feel myself as much at a loss to give any tolerable degree of satisfaction on this point, in detail, as I was on the subject of its progress. I do not correctly know the various stages of its advancement, and therefore, cannot specify its degrees of improvement. That it has improved very extensively, is known to every body. Its causes have been, in no small measure, the extraordinary demands for our products, when the conflicts of foreign nations required them, and our neutral situation rendered their transportation safe. Our farmers redoubled their diligence, and their gains stimulated their industry, and rewarded their exertions.

I know of no auxiliary to the improvement of our old settlements, so prominent, as the general adoption of the *plaster and clover husbandry*. This great source of fertility originated in this state, at first by individual exertion. But our society, at an early period, had great merit in spreading through the country a knowledge of the properties and effects of the *gypsum*, and in impressing its advantages. These became so palpably visible, that the most incredulous were convinced. Its effects were objects of the senses, and inquiries into the principles of operation were left to theorists, who do not, to this day, agree on the subject of them. I mention this, not only as one of the most efficient causes of agricultural improvement, but to show that farmers are only to be convinced by practical proofs. And beyond any other means of enlightening the blind and confuting the cavilling and obstinate, a **PATTERN FARM**, long proposed by us, would be the best. It is also the only school for educating those who are willing to receive instruction.

The **PYRITOUS EARTH** of *Jersey*, improperly called *marl* is doing wonders in that state. Most probably, it will be found in many parts of our seaboard countries, once covered by the ocean. It promises to be the rival of the *plaster*, if it

bears, as irrefragably, the test of experience. I have witnessed astonishing effects from its application. But its use is yet in its infancy; and it requires more facts, and longer trial, to warrant any solid opinion, as to its qualities, quantities per acre, or kinds of soil, to which it can be most profitably applied.

Marls of various textures are discovered; and are coming into use. *Lime*, of the best quality, we have in exhaustless abundance. The great bodies of *plaster* in the vicinity of our lakes afford ample supplies to an extensive country. *Manures* are more generally collected and applied. Our *ploughs* and *ploughing* are much improved. *Systematical* and *cleanly farming* is increasing; and the *grasses* are more generally cultivated.

We have excellent specimens of *watered meadows*; but **IRRIGATION** is not carried to the perfection exhibited in *Europe*; and particularly in the south of *France*; where it is, and has been, time out of mind, used not only for *grass*, but for *til-lage-crops*, through a great extent of country. And the products raised, with wretched ploughing, and an indifferent style of husbandry, are truly surprising. *Birkbeck's* account of it is amusing, and highly interesting.

DRAINAGE of boggy and wet soils (under-draining particularly) is an excellent European practice of which we have but a partial knowledge.

WARPING—(that is, flooding embanked grounds, over which large streams or muddy rivers can be admitted, to enrich by the deposits which had been held in solution by the waters which are both admitted and drained off through flood-gates) might be profitably introduced; as well as extensive *irrigation*, in many parts of our country; and, especially, in our southern states. All these practices are accurately described in European books. The practice of *warping* is mentioned by *Arthur Young* as an instance of the advantages of agricultural surveys and reports. For until such surveys were made, the knowledge of this practice was confined, and had so been for a great length of time, to a small district in *England*.

We are more accustomed to the use and effects of *water* than those of *fire* ; although all know that *heat* is as necessary to vegetation. as *moisture*. Yet we are very little acquainted with the effects of *FIRE on soils* ; and experiments should be made to ascertain them. I have experienced its benefits, and have no doubt on the subject. Others are not only doubtful, but prejudiced. On this head European books furnish much information ; and their lessons should be attended to candidly. *Fire* and *water* are good *servants*, and should not be suffered to be bad masters. It is as unfair, however, to argue against the prudent use of *fire*, because it produces conflagration and ruin in extreme cases, as it would be to denounce *irrigation* to its salutary extent, because floods spread desolation in their unrestrainable course. *Denshiring*, *burning of clay*, *peat*, &c. have been long practiced in *Europe*, and very little, if at all, resorted to here ; though *ashes*, only one of the offspring of *fire*, are known to be fertilizing. *Mixing soils* of different textures is generally approved, and very partially practised. *Animal manures* are our chief object ; and we neglect those auxiliaries which are in plenty on our farms, and in our power every day.

The first preparatory step towards the advancement of agricultural improvement, is, to satisfy the minds, not only of farmers, but of the community at large, that it is an object of primary importance ; and not attainable, in perfection by mere farmers. If this be not accomplished, efforts to introduce any thing like principle or system, will be arduous indeed. A *farmer* should be considered by *himself*, as well as by all other members of the community, as one placed in a situation to perform the most beneficial services to the public, by exercising a calling in which all other citizens are peculiarly interested. He may be, *personally* no better or worse than others ; but the *art* in which he is engaged is the most essential of all others, to the general welfare. Until a conviction of this truth operates on the public mind, the progress of improvement will be lamentably slow. That it is not, *now*, a general opinion, either among farmers, or other citizens, is, unfortunately for their own interests, too apparent. *We* have

held out premiums for a variety of highly beneficial objects, and, of our own motion, have bestowed some of them; but who has witnessed any emulative contest to gain them?—What other excitements to generous pride and emulation, could be attempted? To say nothing, in farther proof, of the abortive attempts we have made to increase our funds. Public opinion operates on public men; and if there be no public feeling, there is no legislative support or countenance. In all the expressions of popular feeling or sentiment, which have been brought forward during the perturbed period we have lately passed through, who recollects any suggestions, that AGRICULTURE required either improvement or support? Is not this a most indubitable proof of apathy, or want of discernment, on this subject? Of *commerce* and *manufactures* we have heard much; and well do they merit what has been said for their encouragement. But of their *parent*, AGRICULTURE, almost a total silence has been observed;—so far, at least, as regards the assistance it requires from public, or individual contribution and instruction. It is idle to conceal from ourselves circumstances so forbidding and unpleasant. The few efforts made to draw the public attention to the public interest, on this topic, are not disregarded by these general observations, or their merit, in any degree, diminished.

The former part of this address, made to comply, so far as I am enabled, with your desire, was calculated to furnish arguments and invitations, whatever may be their force, and to impress and elicit the aid of every member of the society, in some plan for enlisting the public opinion and feeling, into a service so evidently necessary, and so conducive to the public advantage. Until this is accomplished, it is vain to give other “hints,” for the advancement of the progress of agriculture. My suggestions do not flow from any despondency I feel on the subject; because, with proper exertions, the public mind can be enlightened. And nothing would achieve this desirable object so effectually, as the establishment of societies for promoting the knowledge of its principles, and encouraging and exemplifying its best modes of practice, in all quarters of our country. Each should provide a small, but well

selected LIBRARY. AGRICULTURE should be the leading subject. Selections from the best writers on Husbandry might be introduced, as *school books*, to make early impressions on young minds. Other subjects may be interspersed in those libraries, to entice our farmers and their families to read; and thus conquer their antipathy to what they, contemptuously, call *book-farming*. PREMIUMS for excelling, and honorary notices, would rouse and reward a spirit of emulation. All subjects of difference, especially on political questions, should be avoided; and agriculture be considered the rallying point of good citizenship.

As one proof of the utility of such institutions, with great pleasure, I mention the *Berkshire Agricultural Society* at Pittsfield, in Massachusetts. I have been informed by intelligent persons, who have seen the results and witnessed their proceedings, that they have in a short period, by *premiums*, exciting a spirit of emulation and a desire to gain a knowledge of *practical husbandry*; breeding of *domestic animals*; improving and *neatly cultivating farms*; increasing in quantity, quality and workmanship, *household manufactures*, raising the *cleanest and best crops*, actually viewed and examined by committees making progresses for that purpose; introduced a style of agricultural improvement, uncommon and highly exemplary. And this, at an expense raised by annual subscription, bearing a small proportion to the value of the extensive advantages accruing from it. Annual displays of *premiums*, and, when practicable, the subjects of them, a *procession*, and *public distribution* of the rewards, preceded and concluded by religious exercises, agreeably to the laudable habits of that people, captivate, and invite competition; and accelerate the solid and evident prosperity of the country.

I have mentioned this society, because it is formed in the most western and remote county of that ancient state. Other highly respectable societies in the eastern quarter of our union are too well known to require any notice or eulogy, from me.

I consider the insensibility to the magnitude of the subject, to be the greatest obstacle in the way of advancement, which

agriculture has to encounter. Nor is it a new misfortune. 'The volumes you have published, to the great credit of your patriotism and perseverance, contain almost every thing, I could suggest, for the "advancement of agriculture." A reference to them, therefore, will spare *my* time and *your* patience.—In your first volume will be found, "*Outlines of a plan for establishing a state society of agriculture, in Pennsylvania*, drafted by myself, and honoured by the adoption of most respectable associates, in a committee of this society, more than twenty years ago. During my long service in the general assembly of this state, I zealously endeavoured to procure for it, the patronage and adoption of the then legislature. I was finally defeated by the sottishness of some country members, (for whose peculiar interests I had been labouring,) who turned, in a committee, the scale of votes against me. They insisted that the best mode of improving agriculture, was, "to lay your hands on the plough-handles, and urge on your horses." It was in vain that I combated this quaint, and as they thought, unanswerable *dogma*. If the hands of a common sailor were laid to the tiller, and the vessel steered without compass, observation, or nautical knowledge and skill, her progress towards her port would be as hopeless, as would be the advancement of husbandry under the direction of ignorant ploughmen. *Science*, teaching intelligence in the *art*, is as requisite in agriculture, as it is in navigation. To this, no doubt, must be added, practical habitudes and skill. Yet, with all this unpleasant appearance, our prospects are not cheerless. Most of our countrymen are remarkably *capable* of receiving instruction; and very many *willing* to profit by it. They have, in many encouraging instances, improved most meritoriously, the husbandry of our country, in districts therefore very unpromising. Insomuch, that great numbers of our fields, will bear a comparison with those of the best cultivated countries.

It is a subject of gratulation, that happy prospects seem to be opening. The president of the United States, after the example of his immortal predecessor, has recommended to the notice of congress, the establishment of a national seminary.

I conceive, that one efficacious mode of advancing our *husbandry*, would be, for this, and other agricultural societies, the increase of the numbers whereof, we have always ardently wished, and often promoted; to forward memorials, praying that the subject of *agriculture* may become engrafted in the plan of education, as one of its most valuable branches;—or, in some way, to impress the necessity of national attention, to the foundation of national independence and happiness. Such representations would not only bring the subject into public view; but would most indubitably promote the public interests. Our state legislature, having now the subject of education before them, might also be addressed, on this highly interesting topic.

The lights which *chemistry* affords to agriculture; and the aids which *mechanics* and other branches of the mathematics and natural philosophy bestow on it, are well known to all of us. BOTANY, (of which I am far from intending to speak disrespectfully,) is chiefly a classification and nomenclature of plants. If these were left to scientific *amateurs*; and some *practical* uses were made of this department of science, agriculture would receive great benefits. To instance the GRAMINA tribe; which comprehends a great proportion of the plants grown in tillage crops—*grains* and *grasses*. If their uses, and varieties, and the best modes of culture, were designated, it would be highly conducive to their profitable propagation. The *grasses*, (commonly so called,) which thrive and ripen together, might be distinguished, beneficially. I have always found that sowing permanent grass-seed with clover—which is fugacious—affords the most profitable pasture and hay. *Orchard grass* (*dactylis glomerata*, or cocksfoot,) is the kind I prefer, as the companion of the clover.

Nothing gives a more elastic spring to AGRICULTURE, than *roads*, *canals*, and other *interior navigation*. Your memoirs are not deficient in portraying the utility of these facilities to transportation. They open new channels of com-

munication—new fronts to property—and stimulate improvement, not only in husbandry—but in all branches of employment, to which labour and capital are profitably applied. To these the attention of our national, as well as state legislatures, is now called.

The enumeration of the stupendous and costly *bridges* over our great rivers, exhibited by our state chief magistrate, affords a strong proof of the general wealth and public spirit of our citizens; and a flattering encouragement to our husbandmen; as they facilitate their means of arriving at markets. In this catalogue, he only enumerates those “*lately erected*,” and he has, no doubt involuntarily, overlooked the *High street bridge*—the example and stimulant to them all—erected on piers of solid masonry, in a depth of tide water unexampled; and under circumstances, allowed by European engineers, never before to have been successfully encountered. Exhibiting also the first example in this country, and the second in any quarter of the world, of a *covered* wooden bridge. Nor should the beautiful structure within view of it, be omitted. Although our government may not have bestowed *direct* support to our AGRICULTURE—yet we should rejoice that such aids to its advancement, though erected with private funds, have, much to the praise of their patriotism and attention to the public advantage, been encouraged, and “*honourably mentioned*.”

I must request the indulgence of the society, in excuse for the desultory and imperfect manner, in which, owing, among other incapacities, to indispensable engagements, I have treated a subject all of us have so much at heart. It will be seen, that I could (except in a few instances) only make general observations. I must also apologize, for the non-compliance, specifically, with the terms of their request.

To *you*, many of the observations may be superfluous. But they were suggested by the interest I have long taken in the subject of them.

Your meritorious endeavours have been crowned with on-

ly partial success. But, I am satisfied, and you must be conscious, that much good has flowed from them. "It is not in mortals to command success;" but it is your consolation, and should be your honourable pride, that you have laboured "to deserve it." Let us cheerfully persevere; and our objects will be attained, by sure—though, to our zeal, apparently slow degrees.

ERRATA.

- Page xvi. For foreign "Treasurers," read Treasures.
For "starving cultivators," read starveling cultivators.
For "fugatious," read fugacious.
- xviii. For "convert," read converts.
At the end, for "shacklets," read shackles.
- xix. For "imployed," read employed.
- xxiii. For "setteling," read settling.
For "commone," read commons.
- xxiv. For "*tentures*," read *tenures*.
- xxv. For "*non sobis*," read *non vobis*.

AN ADDRESS
ON THE
PROGRESS OF AGRICULTURE,
WITH HINTS
FOR ITS IMPROVEMENT IN THE
UNITED STATES:

DELIVERED BEFORE THE

Philadelphia Society for Promoting Agriculture,

AT THEIR ANNUAL MEETING, JANUARY 14th 1817.

BY JAMES MEASE, M. D.
One of the Vice-Presidents of the Society.

At the annual meeting of the *Philadelphia Society for Promoting Agriculture*, held January (1st mo.) 14th 1817. The Second Vice-President, Dr. Mease, delivered an address, "On the progress of Agriculture, with hints for its improvement in the United States."

Whereupon it was resolved unanimously, That the thanks of the Society be presented to him, and that he be requested to furnish a copy of his address for publication.

Extracted from the Minutes.

ROBERTS VAUX, Secretary.

AN ADDRESS, &c.

PERSUADED of the utility of annually laying before our Society, a condensed view of the progress of Agriculture at home and abroad, and other subjects connected with the objects for which our association was formed; with such circumstances and events as may tend to improve them, that are likely to prove injurious, or that may furnish hints for obviating their effects in future years, I determined to address you on the present occasion.

Permit me previously to treating on domestic affairs, to notice the extraordinary change that has taken place with respect to the state of agriculture in Europe, in the course of the last year. During the continuance of a war unexampled in the annals of the ancient or modern world, for the number of the victims that have fallen, for the extent of the measures taken, the means employed to carry it on, and for the change of policy in those who have at various times been engaged in it; the extra demand for every species of food, especially of a vegetable nature, occasioned by the fair consumption of man and beast, and the unavoidable waste that takes place in armies and navies, necessarily caused a ready sale, high prices, and sometimes great scarcity, especially in England, which notwithstanding its justly boasted Agriculture, seldom raises enough vegetable food for her internal consumption:* but still, the

* See Appendix A.

farmers, notwithstanding the combined pressure of the annual increase of general taxes, and also of those to which agriculture is exclusively liable; rise in the price of labour,* of rent, and of every article of the necessaries of life, were enabled to thrive, to improve their land, and to assume a style of living, which their fathers or themselves a few years since never expected to be able to indulge in, and at which many of the aged, when they reflected upon former times, were astonished. A great and serious change however took place, from causes, some of which continued to operate until the last autumn, when the general distress from another and opposite cause was continued, and from their combined effects, a depression of prices in the first instance, and rise of them since the last harvest, distress unexampled in extent and degree has been produced, which every friend to humanity must deplore.—The causes to which I allude, were the exclusion of British manufactures from the United States, and the continent in 1812; followed by three uncommonly fruitful harvests in England in succession, viz. 1812, 13-14: the well grounded prospect of peace from the events of the war on the continent in 1812, and the actual return of peace which caused the vast governmental demand for produce greatly to lessen; and finally from the ample continental supplies which immediately took place after that event.

The British government yielding to the universal clamour of the nation, passed a law to prohibit the importa-

* Mr. Brougham stated, (April 1806,) in the House of Commons, that the total increase in the expences of cultivating a farm of 400 acres, since 1792 including assessed taxes, as equal to £282, 8s independently of the great rise on lime and manure,—and the income tax of 10 per cent. The increase in the taxes affecting the necessaries of life, has added to the price of labour, among which is that on malt, by raising the price of beer, the national drink. The duty on malt, since 1792 has been raised from 10s 7 to 34s 8 per quarter of eight bushels.

tion of every species of corn, until they should rise at home to certain prices, which from the severest scrutiny on the subject, and examination of farmers it appeared were required to pay for the expense of culture, and to yield a reasonable profit.* England even became an exporting country, and was enabled to dispose of a portion of both animal and vegetable produce. During the past year, we beheld with some degree of wonder, the rare occurrence of cargoes of potatoes, and much beef and pork from England and Ireland, arrive in our ports. A great change however, has since taken place. The past season in Britain, and in many parts of the continent, particularly in the fertile soil and fine climate of France, has very much resembled that which we have witnessed in our own country; and the general diminution of the crops produced by the adverse weather, has caused an unexpected and extensive demand for our produce, and a consequent increase in the price.† Thus proving, in our own country, at least, the great inducement and encouragement which the farmer has to endeavour to improve his art, to preserve the fertility of his land, and to cause it to yield its greatest possible produce. For notwithstanding the little estimation in which the people of Europe affect to hold our knowledge or practice of Agriculture; it is a fact, that few years elapse without their application to us, to supply a pressing demand for vegetable food.

The United States have witnessed the most extraordinary weather since March last, ever known since the settlement of the country. After a severe winter, especially towards its close, the weather become unusually mild for the season, from the middle to the last of March; and predictions were made with some confidence, as to the certainty of the farmer being blessed with the opportunity

* Wheat must sell for £4 the quarter.

† Flour on the 13th January was \$14 per barrel in Philadelphia,

of commencing his labours in the field at an early date:— but the good tidings had scarcely been announced, and the self-gratulations were scarcely made, before a complete refutation of the prognostic took place, by the occurrence of severe cold very generally throughout the United States and Canada: even parts of rivers that had not been frozen during the preceding winter, were passed on the ice with heavy loads. The weather continued unusually cold as the spring advanced, and even rooms exposed to the genial influence of a southern sun, in Philadelphia, were not comfortable without fire in the morning and evening, before the middle of June. In the country there were few days during the whole summer in Pennsylvania, in which fires were not required by sedentary persons, all day. Not a week has passed since March, without the newspapers announcing the occurrence of frost and ice, in some parts of the United States. At Quebec snow fell from the 12th to 18th April, and between those dates at Chillicothe, Ohio, followed by sharp frosts. The peach trees there had been previously in blossom.

Snow fell on the 14th May at Albany,* and on the 5th & 6th of June at Bangor in Maine, after a warm rain; also at Peachham, in Vermont, on the 7th June, 6 inches deep. At Montpelier, in Vermont, the weather was colder on the 6th 7th and 8th of that month, than ever had been known at that season. and the snow was one foot deep on the hills in the vicinity of the town. At Hallowell in Maine, snow fell in the first week of June, and was followed by hard frost. The spring was uniformly cold in Pennsylvania, and to the south, so severe a drought was experienced, that many hundred acres of wheat were ploughed up from a conviction

* " Travellers arriving in the city from the westward, reported that the country in many places had the appearance of winter, the hills being as white as in the month of January."

that they would not pay the expense of preparing the ground and the cost of reaping. Indian corn was in many places re-planted, in consequence of that first planted having perished. At Charleston, S. C. the drought was peculiarly distressing, no rain having fallen for eight weeks, previously to the 29th March.

The changes in the temperature of the air were also remarkable for their rapidity during the months of May and June; and the heat of summer of one day was often succeeded by cold weather.* At Boston, the thermometer rose to 82° on the 5th of June, and fell to 52° next day. Changes equally great took place in New York, Philadelphia, and in almost every State in the Union. It is generally agreed that these vicissitudes in temperature have been greater than ever were known in the United States. In general the deficiency of rain continued throughout the autumn, but at New York and Philadelphia it rained for several days after the 12th September; on that day snow fell at Springfield in Massachusetts, and the mountains of Vermont were covered with it.† What adds to the extraordinary character of the season is the fact, that the winter, which by reason of the cold spring summer and autumn, we had probable grounds to believe would be unusually early, did not on the contrary make its appearance in Philadelphia, until the 11th inst. On the 5th of December, the Hudson was passed with teams on ice at Albany, but mild weather succeeded. A few cold days were experienced generally throughout the United

* At Quebec, between the 12th and 19th of May, the Thermometer was at 75° and on the 29th there was ice a quarter of an inch thick. The spring was said to be more backward than any for the last 25 years.

† At Hanover, N. H. the Thermometer was on

Thursday 25th Sept. at sun-rise, at	23°
Friday,	20
Saturday,	20
Sunday,	25
B	

States, about the 22d and 23d of December, and the Delaware was frozen below the falls at Trenton, but the following week, the weather was mild and pleasant, requiring very little fire. Severe cold was also experienced at Hallowell in Maine, at the same time; but "moderate and even warm weather," succeeded. On the 27th of December the thermometer at the Health office, Philadelphia, in the shade at 2 o'clock P. M. was at 64° ; and on the same day at Alexandria, in the District of Columbia, the singular fact was noted of its being at 58° in the morning, that is, three degrees higher than it was on the 21st August last; and the heat of the same day, at 2 o'clock P. M. was only one degree above that of the 21st of December. At Montreal the snow had nearly disappeared, and the rivers which had been frozen over had opened in the channel.*

Thus the phenomena presented by the past and present season, shew to demonstration the correctness of the opinion I have long entertained, viz. the impossibility of forming any conclusion as to the weather that will follow the appearances of a day or week, or month, and justifies the remark long since made by a correct observer, that our "climate is invariably variable." We may most truly say, that as regards the weather, we "know not what a day will bring forth." In England, it also appears that the season was cold.† In Scotland, cold cloudy and wet, with few intervals of clear genial weather, and the harvest was one month later than usual, and very deficient. The same unfavourable weather is said to have prevailed in most parts of the continent of Europe.‡

* On the 4th January, it is stated in the Montreal Courant,—“that the snow has almost entirely gone off, and with but little variations, the Christmas holy-days have more represented the beginning of a Canadian spring, than the season of winter.”

† There was a considerable fall of snow in October, in the lower parts of Cambridge and Huntingdonshires, and the frost was very severe.

‡ See Appendix B. for additional facts on the weather.

The consequences of the weather I have noticed were such as might be expected. The crops of Indian corn and of grass were very short. It is calculated that not above one third of the usual produce of an acre has been obtained from either, in the state of Pennsylvania or even in the warm soil of the sandy parts of New Jersey. In the vicinity of Philadelphia however, I have observed, that upon well manured lots, the produce was quite as good as usual. In some parts of Maryland, and in the northern and eastern States the corn failed entirely. Wheat barley and oats have been as productive as common, except where the first named grain was much injured by its old enemy the insect, absurdly called Hessian-fly:—another proof that a cold winter has no influence in destroying that pest. Buckwheat, always a precarious crop, was severely injured. Oats were generally much better than common, and as this fact offers a useful deduction, I deem it proper particularly to notice it. It is well known, that in the United States oats seldom attain that degree of size and plumpness which are observed in that grain in Britain,* owing to the rapidity with which the heads fill, and the lateness of the season at which they are sown. But the cool season just passed, by causing the slow growth of that plant, permitted the filling of the heads, and their maturity to progress simultaneously, thus doing away the injurious effects, which, but for the season, would have as usual followed the late day at which they were sown. The conclusion I draw from these facts is, that we are taught

* This remark applies in particular to oats, long naturalized in our country. But it does not apply to the fine oats that was imported from England within a few years, and sown in the vicinity of Philadelphia, by the late Mr. McMahon, who shewed that in five years, it suffered no diminution in quality; and samples are now in the cabinet of the Agricultural Society which would do credit to the markets of London, Dublin or Edinburgh.

by them, the benefits to be derived from an alteration of the practice of sowing oats and barley so late in the spring as common; the consequence of which is, comparatively light grain, particularly of oats, as already noted; whereas if they are sown at an earlier day, they would of course be longer in coming to maturity, and from the above causes would unquestionably increase in size. This reasoning is supported by the facts, that in England and Ireland, where those grains grow slowly, (owing to early sowing and cool summers,) the barley generally, and oats always, unless in unfavourable seasons, are heavier than in the United States; and in the county of Somerset in Pennsylvania, where from its locality, the summers are also moist and cool; oats are better and larger than in any other part of the state. The early sowing recommended may be easily accomplished by adopting the practice of plowing ground in the autumn, and harrowing in the grain without a spring ploughing; a practice that has been adopted with respect to barley several years since in this state with marked success;* and which besides the advantage stated of improving the quality of his grains, will enable the farmer to gain at least two or three weeks in the spring, and afford him time to finish fencing and other farm work with his own regular labourers: whereas, by deferring the preparation of the ground until the spring, he is obliged to permit necessary work to remain undone, or if done, to interfere with the regular cultivation of the farm, and do many things out of season, or be put to the expence of hiring additional hands.†

The short crops of Indian corn and grass, although they caused a deficiency in the usual revenue of the farmer, have

* Domestic Ency^a. art. Barley, Philadelphia, 1803. In England it appears from an Arthur Young's survey of Essex County, that the practice is general in Suffolk, and is deemed a great improvement in farming.

† See Appendix C.

not been without advantages; for they have thereby been taught a lesson from which they may derive considerable profit in future years. From being obliged to provide the means of winter sustenance for stock, they were induced to look about for resources within themselves; and necessity, that parent of useful inventions and of industry, as well national as individual, forced them to have recourse to various expedients hitherto not practised, and among others to economise their Indian corn fodder, which all know was generally fed to great waste by the dry cattle in the field, or permitted to stand untouched.—During the past season however, the corn stalks were carefully cut off close to the ground, and either fed in the barn-yard in racks, or what is much more economical, cut fine, and fed with ground oats or ground corn, or rye and cut straw in troughs. The corn blades too, which when carefully saved, make admirable food for horses and cattle, were timely stripped, dried and housed, and even the corn husks have been made to contribute to the stock of food. Thus were the animals nourished, and the manure strictly so called, saved, and put under command; but much more will be made during the winter and spring, by the decomposition of all the offall vegetable substance from the provinder, which had the plan mentioned not been adopted, would have wasted its substance by evaporation, in the field, where it originally formed part of the plant. I dwell with more satisfaction on this subject, because I can speak experimentally with respect to the nourishing quality of corn stalks, when cut fine and given to stock, and have several years since publicly recommended the adoption of the practice.

As connected with the Agriculture of our State, I beg leave to give the statement of the amount of the produce exported from Philadelphia, during the three quarters of 1816.

The whole amount is \$7,599,76. The number of barrels of one of our staple articles, viz. flour was 26649—which at the average price of \$10 amounts to \$266490. But as during

the last quarter, considerable shipments of that article have taken place, twenty-five per cent may be added to form an estimate of the whole number of barrels shipped, during the year 1816. The number of American vessels cleared from the port of Philadelphia was 310.—Their tonnage amounted to 55,446. The whole number of clearances was 437, and the tonnage 78,844.

The only article of import subservient to Agriculture is Gypsum, of which 19452 tons were imported during the last year from Nova Scotia. When we reflect that much is also imported into New York, and some into other States, and that the quarries on Cayuga Lake are in active operation, and found to produce Gypsum of an excellent quality, we may form some calculation of the quantity of that inestimable mineral production consumed in the agriculture of the United States.

Among the desiderata of American husbandry *threshing machines* have long been ranked; and so early as the year 1792, a successful attempt had been made by a gentleman of Philadelphia to construct one, the model which of is now in the cabinet of the American Philosophical society of Philadelphia. It is to be regretted, that the gentleman* in whose ingenious mind the excellent idea of that useful machine originated, did not prosecute, it as we should probably have had those machines in operation in the United States, even before they were generally introduced into Europe; and the old world might have been indebted to us for one of the most useful implements of husbandry, as it has been for a knowledge of the application of steam to a purpose the most useful and important in human life, and most efficient as a mean of defence in naval warfare, that ancient or modern ingenuity can boast of. I know I am anticipated by all of you, when I mention the stemming of rapid steams, and the safe and expeditious na-

* Col. A. Anderson. See Appendix D.

vigation of our sounds and bays by steam-boats;—and the construction of steam-frigates, by the lamented FULTON.

The desideratum mentioned of the threshing machine has been supplied by Mr. Dumbleton, who arrived during the last summer from England, and put one into operation at Mr. John Barney's, Port-Pen Delaware, which I am informed has given complete satisfaction, by its answering all the ends that can be desired of such an implement, viz. speedy and clean threshing, ease of management and portability.

It appears that burning clay for manure has been practised with great success in Ireland and Scotland; and as there are extensive districts of our country, the soil of which is of that nature, I beg leave to invite attention to this new means of enriching land. But as I propose to give a full account of the mode of conducting the process, I have not deemed it necessary to be particular with respect to it on the present occasion.

An important addition to the stock of our agricultural information has been made by that indefatigable friend to the art, Sir John Sinclair, in consequence of a visit paid by him in 1815, to Flanders, the result of which he has since published.* Among other useful facts related by him, he has established beyond the possibility of a doubt, the efficacy of certain mineral steeps in preventing smut in wheat; and the fertilizing properties of the ashes produced by the combustion of *peat* extracted from salt marshes in Holland, on crops of clover, the succeeding crops of wheat, and in preventing the increase of all sorts of insects; in destroying mosses and lichens, which injure pasture-lands; and in protecting the wheat from mildew, a disease to which from its situation, Flanders is extremely subject. It is probable,

* Hints regarding the agricultural state of the Netherlands. 1815.

the particulars will be inserted in the next volume of the memoirs of our Society: I shall therefore merely state in addition, that as there is reason to believe peat of a similar nature to that of the Dutch, abounds in the marshes of our extensive coast, and on the borders of the brackish rivers and creeks of the United States, the farmers in the vicinity of them would do well to search for it, and to make the experiment with its ashes, on the crops just mentioned. It may happen that they will prove a substitute on their soils for that invaluable inland manure gypsum, which it is well known produces not the least effect as far as the influence of the sea air extends.*

I state with pleasure that I have received information from a correspondent in Maryland, of the discovery of large beds of alluvial deposits, in Kent and Queen Anne Counties, similar to some of those found in various parts of west New-Jersey, the utility of which as a manure in the sandy or light soils of that district you all know has been found, when cautiously used, to be very great; and I have no doubt that future researches in the peninsula, between the Delaware and Chesapeak, and indeed in every part of the tract constituting the ancient sea coast of our country, will discover similar deposits. The fertilizing properties of those substances cannot fail of proving highly beneficial to the land in their vicinity; but I must caution those within whose reach they are, not to depend entirely upon them for restoring the exhausted state of the soil; for although independently of the good effects known to be derived from the mere circumstance of the stimulus given to plants by the new earth in which they grow; considerable advantage will follow the decomposition of sea shells and other animal remains with which they are mixed; yet if successive and exhausting crops are taken from land dressed with the new substances; if part of the increased produce be not

* See Appendix E.

applied to the feeding of stock in the barn-yard, and the manure thus obtained be not used to give body and life to the stimulated soil, their expectations of the treasure now dreamt of from the use of those substances, will certainly not be realized. But the addition alone of manure will not answer all the desired end of the husbandman; the earth will sicken even of manure: rotations of green fertilizing or covering crops are indispensably necessary to recover the earth from the exhausting effects of an uninterrupted cultivation of tobacco and grain, or of any one crop.— This is not mere theory; the experience of every judicious farmer or cultivator in Pennsylvania, will support me in the propriety of this injunction.*

The importance of good roads and canals to all countries, in facilitating the cheap and constant transmission of the products of agriculture and of labour generally, is so obvious, and has been so fully ascertained by the experience of Europe; that the subject cannot be too often, nor too forcibly impressed upon the attention of the public. They mark the genius, spirit, enterprize and good sense of a people, and are indissolubly connected with individual comfort, and national wealth. During the continuance of the universal war that recently vexed the European world, such was the profitable external commerce enjoyed by the United States previously to their entering into the war, that it was impossible for some time to convince the people or legislators, notwithstanding the able papers written on the occasion, of the infinitely greater value of internal commerce and of a home market, than of foreign trade; and although it was frequently pre-

* As the knowledge of the most judicious mode of applying the substances mentioned to the soil, is of consequence, the society will thankfully receive communications on the subject; and in their name I beg leave to request them,

dicted that the effects of the inattention complained of, would every year be more and more perceived in retarding the improvement of the country and be severely felt, in case of a war, the progress of which was deemed by many gradual but certain; yet a deplorable indifference to the subject on the part of our general and state legislatures continued. But since the restoration of peace has enabled all the maritime nations of Europe, to be their own carriers, and the dear experience of the increased expense and obstruction to the public business occasioned by the want of good roads and canals during the late contest with England, the importance of our internal commerce; and of facilitating the intercourse between remote parts has been forced upon the public; and I am gratified in being able to state the increasing attention that has been paid for a few years past in most of the states to the wise policy of internal improvement.* In many of the states canals intended to connect various streams, and others for the special purpose of transmitting produce have been dug, are in progress, or in contemplation. Pennsylvania and New-York are proceeding partly with separate canals, and jointly co-operating in others,* which will be of mutual benefit. Pennsylvania together with Delaware and Maryland, have also subscribed largely to the completion of the long projected and important canal to connect the Delaware and Chesapeake, and only wait the aid of Congress to proceed. A disposition in that body having at last been evinced to promote internal improvement,† it is to be hoped they will be induced to authorise the advance of the necessary funds to insure its completion.‡ Pennsylvania was early alive to

† Virginia, hitherto backward in her attention to roads and bridges, has done herself immortal honor by the establishment in 1815, of a BOARD OF WORKS, specially charged with the duty of attending to every object of internal improvement; and ample funds are appropriated to carry their plans into execution.

* † ‡ See Appendix F.

the importance of those sources of national wealth, and ten years before the war of the American revolution, a practicable rout for the canal last named. was traced by a committee of the Philosophical Society of Philadelphia; and immediately after the country began to revive from the destruction and poverty occasioned by our successful struggle for freedom, a grand scheme for connecting the Susquehanna with the Delaware by means of canals was formed; and but for mismanagement, and too great haste in beginning, we might now enjoy the benefits arising from that important scheme. The public mind, however, is now reviving from the state of depression or indifference into which it was thrown by the failure of former attempts; and having the opportunity of acquiring the most ample knowledge of the causes of that failure, the errors of our predecessors may in future be avoided. Omitting a more particular enumeration of the canals alluded to, I beg leave particularly to call the attention of the Society to the noble project of rendering the river Schuylkill navigable by means of locks, which I have no hesitation in pronouncing one of the grandest and most original ideas for the improvement of a river ever offered to the world: for hitherto the views of engineers have been confined either to the clearing obstructions in the beds of rivers, or to the taking advantage of rocks or falls in their channels to make a single dam, for the purpose of obtaining command of the water at certain spots; whereas, when the plan of improvement in the Schuylkill shall have been completed, an entire still-water navigation for boats at all seasons, when not obstructed by ice, will be effected, from the falls to the mouth of Mill-creek in the vicinity of the fine and inexhaustible coal beds, one hundred miles from Philadelphia. One lock is already finished at the falls,

and another is in progress at the upper end. The almost incalculable interest which Philadelphia has in the completion of the scheme, will I hope cause our citizens effectually to aid the company incorporated to carry it on. Its accomplishment would give life and activity to a large tract of country, (now comparatively dull and inactive) by the numerous manufactures and labour saving machinery that would be erected on each side of the river: by the employment of the lame and aged persons, who are now a heavy expense to the adjoining counties and to the city; and by the value of the labour of the hardy yeomanry of the country in agriculture; and the numerous mechanical employments to which a thriving state of it, and of manufacturing establishments have *invariably been found to give rise*; and by the cheap and steady transportation of agricultural produce, coal of the best kind.* wood for fuel, sawed timber, stone, marble, iron ore, and wrought iron, and lime, all or part of which are now brought down by land at an comparatively immense expense, or only for a short time during the precarious and short continued rise of the river, in time of freshes.

As upon an occasion like the present it is proper to mention every thing tending in any way to promote the agricultural interest, I beg leave to call the attention of the Society to the subject of *saving banks*. The effect of these institutions in aiding industry, by the inducement they offer to those engaged in agricultural and other employments, to lay up a small portion of their daily, weekly, and monthly earnings, and to deposit them in a bank, by which the temptations to spending are greatly diminished, are so obvious, and have been so fully established on the continent of Europe, and lately in Scotland and England, that no doubt can

* This coal is of that species called anthracite, and gives an intense heat in stoves or fire-places where there is a strong draught.

be entertained as to the immense advantage that will be derived from their adoption in the United States; and I beg leave to urge their being instituted where the sphere of your influence extends. Mechanics and others in Europe, who depend upon their labour for their support are paid at so low a rate, that in order to lay up a small sum every week, they are obliged to deprive themselves of some of those things which in this country would be deemed the necessities of life; but in the United States, such is the high rate at which those engaged in mechanical or agricultural labour, are paid, that no such sacrifices are necessary; it is only requisite to part with a small sum over and above what is necessary to furnish them amply with every comfort which a reasonable being can desire; a sum which if not thus disposed of would certainly be spent in useless articles of dress, or in idle amusements. By placing their savings in a bank, the person will have the satisfaction of knowing that they are safe beyond the possibility of loss; and that they will daily accumulate, and be ready at a moment for him, when the hour of real need shall arrive. While however urging the adoption of this truly important economical measure, I cannot avoid stating that they ought in all cases to be organized by the public authority of a city, county or town; because an idea of security, (so essential to the desired extension of their benefits,) will be attached to them, and this, an association of private persons might not excite; it is moreover as much a duty of the public authority to provide the means of preventing mendicity, and to encourage moral habits among its citizens, as to enact laws for the relief of existing poverty, or for punishing crimes actually committed.*

In the spring of 1816, several cases of serious indisposition, and some of mortality, occurred in the town of Boston

* See Appendix G.

and its vicinity, from grown persons and children eating bread and other dietetic preparations, composed wholly or in part of rye; and as that excellent grain is known to be very subject in the New England States, and in countries of Europe, in which a climate similar to those States prevail, to a morbid affection of the seeds, called ergot, causing them to lengthen, and turn black, and to acquire deleterious and singular properties; it is highly probable that the opinion attributing the diseases mentioned, to the infected seeds having been ground up with the perfect grains is well founded. Indeed the circumstances attending the cases of the subjects who were sickened, give very strong probability to it; and as the same diseased state of the rye does sometimes, though happily seldom occur in Pennsylvania, I have thought it useful to mention it on the present occasion, as a caution carefully to screen such grains from those destined for flour, and even to cause them carefully to undergo the process adopted in our improved mills for cleansing grain before being ground. I think it also proper to add, that I have reason to believe, that there is a great similarity to ergot in the smut which often affects the wheat of Pennsylvania, and the middle States, and hence must suggest the propriety of the same care being taken in scouring grain produced from a field of wheat in which smut abounded, as I recommended in the case of the rye; and in both cases to prevent domestic animals, especially those with young, from eating the chaff of such diseased rye or wheat, or even inhaling the dust arising from the process of winnowing them.

As a powerful means of promoting agriculture, I beg leave to urge the enlightened husbandman of the United States to omit no opportunity of committing to paper all such remarks as may offer to him in the course of his operations,

whether tending to shew an improved mode of cultivation, or to point out injuries which may have occurred from his adoption of measures or crops, either from necessity, inattention, or by way of experiment. By the first measure, those less informed than himself will be instructed, and by the latter, erroneous steps will be avoided. The good that may be thus done is so obvious, that to dwell on it is unnecessary. And here let me urge the importance of farmers noting even single facts, as soon as possible after their occurrence; let them not trust to memory for the preservation of any useful remark, until a number are collected, for memory is treacherous; and after a lapse of time, some particulars may be omitted upon which the utility of the record may depend; thus he may be the unwilling agent of leading others into error, the discovery of which will hereafter give every conscientious man pain. Death may also intervene between the occurrence of the remark and its record, by delay: whereas by speedily communicating the fact, the desirable object of spreading information quickly will be obtained. Let them also not be deterred from communicating, by the consideration of the supposed poverty of their materials for a paper, or from being unused to writing: a single fact will be acceptable, in any style, and will claim a preference to theoretical disquisitions; for too many of these have already been published by theoretical men which have misled others of a similar cast, who in all countries have engaged in the attractive employment of agriculture. We want facts noted in the field by men who handle the plough, or who personally superintend the work of their servants; and of such a complexion I am happy to think with only one or two exceptions, will the papers in the volumes of our society be found to consist. The agriculturalists of the United States, while they exhibit a commendable reluctance in lay-

ing aside their accustomed practices in which they have been educated, with the results of which they are acquainted, and equal caution in the adoption of new or untried modes, are nevertheless exceeded by none in a similar employment in any country, for sound sense, intellectual intelligence, enterprize, and freedom from prejudice, (the source and basis of all rational improvement,) or can more clearly convey their ideas in conversation; but like the farmers in other countries, they discover an unwillingness either to take the trouble to commit facts to paper, or to appear as authors; but this reluctance it is to be hoped will be overcome, when they reflect that in no other way can the business of their lives be improved; that their remarks may call forth those of others, from which they themselves may derive instruction; and lastly, that they are writing to friends, who will gladly receive their letters, and make the best use of them for the promotion of the objects for which they write, and we are associated. With the view of giving our agricultural fellow-citizens an opportunity of making notes of such occurrences as may likely to be useful, and of diffusing information, the society have encouraged the publication of an agricultural almanac in Philadelphia, which I am happy to hear has met with a sale that emboldens their continuation in future years.

The advantages resulting from insuring farm houses and farm buildings from loss by fire, so far exceed the trifling amount of the premium paid to the officers, that I cannot omit the opportunity of warmly urging the adoption of the measure. Scarcely a year passes without some serious conflagrations taking place in our state, either of houses or barns, and when the latter are burnt, the loss is often considerable. The practice of thatching barns, which is too common in the interior of Pennsylvania, ought to be dis-

continued, and shingles, or what are still better, tiles or slates be substituted.

Hitherto the general, or state governments have done nothing for the promotion of agriculture except in an indirect way, (viz. by incorporating turnpike and canal companies:) and although the greatest solicitude on the part of rulers, and pecuniary assistance are lost upon a people deficient in energy, enchained by superstition, or oppressed by arbitrary regulations; yet when these obstacles to improvement do not exist, but on the contrary the energies of the public mind are left unrestrained, and that mind is found to be bent on improvement, countenance from the government of a country, and occasional pecuniary aid will render the most essential benefits to agriculture, by serving as a kind of pledge to the people of the sense entertained of its importance, and by enabling societies instituted for its promotion to reward the meritorious exertions of individuals who have set examples of superior industry, or good management in any way; who have made capital improvements at an expence which their own finances could not well bear; or in short, who have in any way promoted the objects connected with agriculture horticulture, or rural economy.—Societies supported merely by the private subscriptions of the few members who are disposed to join such associations, cannot for obvious reasons be supposed able to offer premiums to any extent, while their amount to a government even supposing they were all claimed, would not be felt; but as this is an improbable event, the objection which might be made by some persons to the amount of the sum so taken from the public purse, will not hold good, while the benefit and honor derived from the patronage afforded by government would remain, and induce

a gradual progress in improvements. An excellent opportunity is now afforded of assisting the cause of agriculture and internal improvement, in the projected establishment of a new department in the national government, and it is to be hoped that it will not be lost. Indeed it is impossible to calculate the effects on the prosperity, or on the domestic comfort: or the amount of the wealth which the nation may derive from a *Secretary of the home department*, resolutely and actively directing his attention to every concern from Maine to Georgia, which naturally comes within the scope of the duties arising from such an office, such as canals, and roads, obtaining a knowledge of the improvements in making and repairing them, and its publication for general benefit; ascertaining practicable routs for new roads, or canals, stimulating those more immediately concerned in their formation to undertake them, under the promise of pecuniary aid, if necessary to complete them: introducing useful implements of agriculture; seeds, plants or trees, useful in diet, medicine, or the arts; labour saving machinery,* and improved breeds of cattle, from Europe, by offering premiums for the same, or directing the attention of foreign public agents, or of the numerous American citizens who visit Europe, either for profit, pleasure, or mental improvement to the subject; and who would delight in complying with the request, from a sense of duty, and the satisfaction derived from the consciousness of having promoted thereby the interests of their country. He might also do good by countenancing and aiding with advice, or pecu-

* The increase of taxes and price of labour in England, have acted as stimulants to the invention of numerous labour saving implements in agriculture, as well as in manufactures; of the former we have none in the United States, except the threshing machine.

niary assistance, cautiously bestowed, ingenious native or foreign artists; by facilitating the discovery of the numerous mineralogical treasures with which the bowels of our country are stored, and forming a cabinet of all those sent to him, for the inspection of artists in future, who may wish to know their localities and various qualities. By means of such an officer, government may command at any moment the intellectual resources of the United States; and thus, upon an emergency in the public affairs, recourse could be had without delay to the combined advantages of a knowledge of the locality of numerous raw materials, and of the best method of employing them for the purposes to which they were applicable. The benefits of such resources are obvious, but will be more fully estimated by those who know the energetic impulse that was given to France, by such an appeal, during the gloomy years of public scarcity in some articles most essential to civilized existence, and to public defence. Through such an officer a system of statistics could be established, that would enable the government to know precisely, or as it were to show a balance sheet of the actual state of the country, as to various branches of manufactures, arts and agriculture: their increase, or decrease, and the propriety of granting or withholding legislative protection. In like manner he might ascertain the gradual increase of population, the chances of existence and the proportions of births to deaths, in different parts of the United States, a species of knowledge of incalculable consequence to this country, and for want of which we are obliged to depend in the case of insuring a life, for calculations formed upon observations on mortality made at Breslaw in Silesia, Stockholm, Northampton, London or Paris. But it would be tiresome even to enumerate all the objects connected with the improvement of the country to which such an officer,

zealous in the discharge of his duty, and supported by the public spirit of the legislature, might profitably direct his attention: I will therefore only say, that from his exertions we might cease to be tributary to Europe for numerous articles which our industry would furnish, and our own ingenuity work up, (and that cheaply because of the general demand) and thus by keeping at home the precious metals, which we export to pay for the manufactures of the old world, we should not again be under the necessity of having recourse to the miserable, and to many, the ruinous expedient of using as a circulating medium, the bills of a host of public and private banks, (many of which in different parts of the Union, had not specie to the amount of a sixth, and some not even a tenth part of their notes, and the debts they owed to depositors;) the solidity of the national strength would be increased, by the increased attachment of the people to the government, which they would find attentive to their best interests, and alive to the wise policy of keeping men, women and children employed; and thus supplying us with home productions, the scarcity of which alone obliges thousands to use those of the work-shops of Europe: and lastly, the means of communication between remote parts being facilitated, a national feeling would be firmly established, and those invidious distinctions and the imaginary opposition of interests, which have hitherto prevailed, would be entirely done away.*

* See Appendix H.

APPENDIX.

(A. p. 5.)

THE following facts prove the gradual rise, and sudden fall, in the prices of grain, in England. After the peace of 1763, wheat rose from 36s. to 41s. the quarter: the average price of it during ten years prior to the commencement of the war with France, in 1792, was 47s. the quarter: during the twenty years beginning with 1794, and ending with 1813, the average price was 83s.: during the last ten years, ending with 1813, it was 92s.: and during the last five years of the twenty, 108s. In January, 1813, it was 120s.; but in November, 65s.

[*Parliamentary Debates. Malthus.*

The following statement shows how dependent England is to foreigners for her grain.

“An account of the real value of corn, grain, meal, and flour, imported into Great Britain from foreign parts, in each year from 1792 to 1811, both inclusive.

YEARS.	Real value of foreign corn, &c. imported.				
1792	-	-	-	-	£. 856,095
1793	-	-	-	-	2,021,993
1794	-	-	-	-	1,768,811
1795	-	-	-	-	1,461,622
1796	-	-	-	-	4,487,116
1797	-	-	-	-	1,455,722
1798	-	-	-	-	1,569,757
1799	-	-	-	-	1,765,840
1800	-	-	-	-	8,755,995
1801	-	-	-	-	10,149,098
1802	-	-	-	-	2,155,794
1803	-	-	-	-	1,164,592
1804	-	-	-	-	1,855,333
1805	-	-	-	-	3,754,831
1806	-	-	-	-	1,106,540
1807	-	-	-	-	1,878,521
1808	-	-	-	-	336,460
1809	-	-	-	-	2,705,496
1810	-	-	-	-	7,077,865
1811	-	-	-	-	1,092,804
Total 20 years.	-	-	-	-	£. 57,420,285

“Above one-half of this amount was probably paid for in specie, a large proportion of which, it is said, found its way to France, and enabled it to carry on the war.”

[*Sir John Sinclair's Political Maxims.* 1812.

(B. p. 10.)

Although the summer and autumn were unexampled in the United States for cold, yet the spring was not more backward than in preceding years; as the following comparative statement in Boston shows:—

MR. HALE—It has frequently been said, that the present season is a backward one, especially before the late rains. This is a mistake, if we have reference to this vicinity. It is far from being a backward season. Men's memories may fail them, but nature never deceives us.

The following comparison of the seasons of 1813, 1815, and 1816, may amuse some of your readers, and instruct them.

Apricots *opened* in 1815, May 1st—In 1816, in *full blossom*, May 3.

Currants and Gooseberries in 1815, in *full blossom*, May 11—In 1816, May 9th.

Cherries in blossom, May 10th, 1813; also, May 10, 1815; *equally forward* May 6, 1816.

Mespilus Canadensis, or Showy Medlar, in blossom, May 11, 1813, May 16, 1815, May 9, 1816. This is an uncultivated plant, and may be considered a fair test of the season.

Peaches began to open in 1815, May 11—In 1816, May 5.

Plums in blossom, May 14, 1815—May 12, 1816.

Pears began to open their blossoms, in 1813, May 20—In 1815, May 18—In 1816, May 13.

Asparagus was cut in 1813, May 14, for the first time in a particular garden.

In 1815, May 6th, in the same spot.

In 1816, May 5th, do.

Here then is a variety of cultivated and uncultivated plants on the same estate, and it is impossible to resist the evidence, that the present season is not among the latest, but may be

rather classed among the early ones. If the cause is asked, we answer true it is we had a long-protracted winter, but the weather suddenly passed to the opposite extreme, and it is believed we have had hotter weather, either to take the mean, or to take the extreme heat, than we usually have at this season. The facts above stated are unquestionable. The prospect at present is very flattering to farmers.

A PRACTICAL CULTIVATOR.

May 14, 1816.

On the 5th March, the fruit trees in Charlestown, near Boston, Mass. were in blossom: on the 29th of that month, the trees were covered with ice and snow in Boston: the snow on a level was more than one foot deep in the streets. The change in the temperature of the weather took place generally throughout the United States on the 17th March. Frost was observable at Charleston, S. C. on the 29th August, and the sugar canes and cotton, in Georgia, were seriously injured. In Tennessee, and the Western States, generally, corn and wheat have been abundant: and in December the first sold for 25 cents and the latter for one dollar the bushel, in Ohio.

On the 14th May frost killed much of the cotton in Tennessee. Snow fell on the 6th June, in New Hampshire, and the western parts of Massachusetts. At Plattsburg no rain had fallen previously to the 5th October, for eight or ten weeks; and almost all the springs and swamps were dried up.

Snow fell on the 6th October, at Brunswick, Maine, two inches deep.

So mild was the weather in the beginning of January, 1817, that at Concord, Mass. "the white pond lilies (not having had time last summer) expanded their leaves and appeared in full bloom." A great change soon took place, intensely cold weather having followed generally throughout the continent. At Montreal the mercury in Fahrenheit's thermometer stood on the 12th January at 12°, and gradually fell to 14° below 0, on the 22d. At Brunswick, Maine, on the 13th, it was 15½° below 0, and fell to 17° on the 16th. At Kennebeck it was 32° below 0, on the 15th. At Hallowell, Maine, on the 10th and

11th, it was 20° below 0, and on the 15th, 34°. At Charleston, S. C. the weather had been pleasant until the 17th January; on the 18th it was at 18° on Fahrenheit's scale. At Georgetown, S. C. snow fell on the 13th, for the first time in 19 months. At Augusta, Georgia, on Sunday the 19th, the thermometer was at 11°; but the weather moderated the next day, and on Tuesday "the genial temperature of spring returned." At Philadelphia it has been very cold since the 19th; and on the 26th snow fell one foot deep: on the 4th February the thermometer was down to 2° below 0. The cold has been intense throughout this continent to the 17th of January. On the 15th the thermometer was 2° below 0 of Fahrenheit's scale, at Philadelphia, and at Washington City; and 7° below 0 at New York. In Connecticut and Massachusetts it was several degrees lower. Boston harbour was completely closed, and passable on sleighs as far as Castle Island; a circumstance that has not happened since the year 1779.

(C. p. 12.)

I know that in some districts of our country, barley equal in weight and quality to British barley, is raised. Our brewers even say that more extract is obtained from American than from English malt. The weight of barley, the growth of 1816, and brought to Philadelphia, has been from 49 to 54 lbs.—These weights are rather greater than in common years, and may be fairly ascribed to the slow growth of the plant, arising from the cool season. The country on the Brandywine river, and the vicinity of West Chester, Penn. are above particularly alluded to. The state of Rhode Island also produces great quantities of fine barley—and the breweries of New York and Philadelphia are in part supplied with the article from that state.

Exclusively of the advantage derived from the gain in time to the farmer, by preparing the ground in the autumn, the fertility of the soil will certainly be increased by the exposure of

its internal surface to the frost; and for this reason the autumn ploughing should be as deep as possible. The fertilizing principle is unquestionably nitre, the materials for which we know exist more or less in the air, as is proved by the ease with which that salt is procured by lixiviating the earth under stables, sheds, and tobacco houses, with water, and by evaporating it, and purifying the salt thus obtained by repeated solutions in water. No difficulty occurs in explaining the formation of nitre, knowing as we do that "the component parts of nitrate of potash are nitric acid, water, and potash, which may be resolved into the following elements: oxygen, nitrogen, hydrogen, and potassium; and all these elements are experimentally known to be present in the situations where salt petre is formed, with the exception of potassium. In the supposition that the salt petre is a product, and not an educt, of the above process, it must be a component principle of some one of the elements present, or a compound of two or more of the principles of those elements, or of two or more of the elements themselves."*

The common objection I have heard urged against early sowing, is the want of warmth in the ground, owing to which the seed would not vegetate. But this is futile: for grain cannot suffer from being in the ground, and will be ready for the gradual increase of heat in the spring. Both oats and barley will vegetate at a low degree of temperature. Even in the cold climate of Scotland, "barley has been sown on the winter furrow, as early as March, and never failed to produce an abundant crop, and of a superior quality."†

It should always however be held in mind, that barley requires a deeper cover of mould, and more pulverised soil, than oats.

* Kid on the Natural Production of Salt Petre. Trans. Royal Soc. Lond. 1815.

† Account of Husbandry in the improved districts of Scotland, by Sir John Sinclair, p. 249. Edinb. 1812.

(D. p. 14.)

A Threshing Machine, upon Col. Anderson's plan, was erected in Maryland, in 1792, and answered well; but after sometime the wheel warped, and impeded its perfect operation. The absence of the inventor, and want of confidence in the owner of the machine, or want of energy, occasioned its being laid aside.

Besides Col. Anderson's plan, Mr. Hoxie, of Hudson, N. Y. and Mr. Deneale, of Virginia, obtained patents for Threshing Machines, but they have not been successful in introducing them. In 1802, Mr. D. Prentiss, from Edinburgh, erected six or seven, in Pennsylvania, Delaware, and New Jersey, on the Scotch principle, which answered well; but they required more care than common labourers would bestow in feeding the machine to prevent its choking; and as common workmen could not repair it when out of order, and the maker was at a distance, they did not multiply. Mr. P. also engaged in another line of business.

The advantages of Threshing Machines are, 1. The enabling the possessor to take advantage of a sudden rise in the market for grain. 2. The more complete cleansing of the grain from dust and smut, than by the flail. 3. Rendering the straw more eatable by stock, in consequence of the bruising it undergoes in beating out the grain: and if mixed with fresh cured clover hay, it will more readily absorb the moisture in it, than when the grain is threshed by the flail, and thus add greatly to the stock of winter provender for cattle.

(E. p. 16.)

A gentleman of Philadelphia informs me, that taking the hint from an account of the practice of burning clay, which he read in a foreign journal, he has directed an experiment to be made on his land, at Port Penn, of burning marsh-mud, with a view of using it as a top-dressing for grass and grain, and as the water at that place is brackish, and that kind of

soil abounds in roots of decayed vegetables, there can be no doubt of the fertilizing effects that will be produced by the employment of its ashes. He has already tried the ashes of those pests of a moist soil, tussocks, on grass land, and from the present appearances exhibited by the spots dressed with them, he expects the most beneficial effects from their use on the succeeding crop. Tussocks yield a great proportion of their weight in ashes, and burn readily, after being set up in small heaps, oven-fashion, for a few days, in the sun.

(F. p. 48.)

A Company is incorporated in the State of New York, "for the purpose of effecting boat navigation between Seneca Lake and the Susquehannah River," and have laid a memorial before the government of Pennsylvania, soliciting its aid and patronage. The completion of this work, with that now in considerable progress between Seneca and Ontario Lakes, will open a Boat Navigation from the Lakes to the Chesapeake.

The recent completion of the Locks on Black River, below Brownsville, effects the navigation of the River from Lake Ontario to Brownsville.

The want of the Chesapeake canal was severely felt during the late contest. The property, public and private, taken by the British blockading squadron, and the cost of transporting articles by land that could have been sent by that canal, if it had been finished, amounted in value to much more than what is wanted to complete it, or than the whole canal will cost.—Happy would it have been for the United States, had the eloquent speech in favour of this Canal, of the lamented J. A. Bayard, delivered in the Senate of the United States, in 1808, been attended to by Congress.

These are minor objects, compared with the stupendous project of connecting the River Hudson with Lake Erie, which originated in New York four years since, and which it is to be hoped will be aided by the General Government.—

By the calculation of the Commissioners, it appears that the whole expense will not amount to five millions of dollars—a mere trifle, considering the extensive benefits that will result from the completion of the work. The remotest corners of the United States would feel its vivifying influence.

Congress, upon the motion of Mr. Calhoun, of South Carolina, have appropriated, during the present session, one million and a half of dollars, and the United States' share of dividends in the National Bank, for twenty years, on seven millions of dollars, owned by them, for constructing Roads and Canals.* —The practicable routes for the latter, and the points of connexion between numerous water courses, so as to effect a great chain of internal water communication, have been so often detailed, and so fully brought before the view of Congress, by Mr. Gallatin, that no delay need take place as to the proper spots to commence the truly patriotic work; the completion of which would create a most desirable revolution in our views and opinions of things, and have a most beneficial effect upon the national prosperity.

(G. p. 21.)

It is a fact well established, that notwithstanding the wages of day labourers, mechanics, and male servants, in the United States, are much beyond what is necessary to their comfortable support, and decent appearance; yet that at the end of the year they are in general no better off than when it began: and whether they earn 10, 20, or 30 dollars per month, little is laid up; and the first and last classes mentioned, have seldom a change of decent apparel. Independently of the thoughtlessness of the people alluded to, I was led to believe that one reason why they indulge themselves in the wasteful habits complained of, is, their not having any way of putting out to good account, small sums of their surplus earnings; and it struck me, that

* The bill was rejected by President Madison!

had they an opportunity of doing so, they would avail themselves of it. These reflexions induced me to publish in my "*Archives of Useful Knowledge*," in October, 1810, a plan of an institution which I termed a "Bank of Industry;" the object of which was to suggest a plan by which the persons alluded to might be enabled to invest such portions of their earnings as they could spare, in order that a sum might gradually accumulate, with interest, and be at command in case of sudden sickness, unexpected misfortune of any kind, or suspension of work during winter. The measure is equally applicable to country and city. In Scotland and England, these institutions have spread rapidly within the last two years, and have even received the protection of Parliament.

The reception of small sums is an important part of the plan of a Saving Bank: for should the deposits be required to consist of large sums only, (say five or ten dollars), the utter impossibility of the class of people (for whom particularly the scheme is intended), refraining from uselessly spending part of their earnings, before they amount to the above sum, will prevent hundreds from availing themselves of the opportunity offered, and from beginning to save; whereas if twenty-five or fifty cents be accepted, they will daily add to their little capital. They will say—what I deposit, will be safe;—if I keep it, I may either spend, lose, or lend it, and never have it returned.

The granting interest on deposits is also a part of the scheme essentially connected with its general diffusion. The inducement to the labouring class to lay up part of their earnings, derived from the reflection of its security; the advantage of having their money placed out of the temptation of spending; and the satisfaction of reflecting on the little capital so accumulated, on any occasional pressure, would doubtless operate with them to add to their stock in bank; but the knowledge, that after it amounted to a certain sum, it would bear interest,* would prove a still stronger excitement, an extra-encourage-

* Private Bankers, in England and Scotland, allow interest on deposits, when left for a certain time. Banks in the United States ought to follow the example.

ment to industry and economy, in order to attain that sum; and when the object was reached, it is reasonable to suppose they would make great exertions, and submit to some denials, to prevent its being broken in upon. The common labouring class of mankind, although generally an improvident set, yet often contains persons who do more than provide for their daily wants, and with commendable foresight endeavour to lay up against the wants of futurity; whose spirits revolt at the thought of seeking aid from public charity, and who would rejoice in the opportunity of securing and deriving interest from their surplus earnings. With others, the ambition of having a bank account, and the pride they will feel in having the fact known, and the gratification derived from occasionally referring to their book to see or show the gradual increase of their capital, will powerfully act: while the stimulus of example will operate on some who may at first be indifferent to the adoption of the measure.

The most common day labourers in Philadelphia can earn a dollar per day throughout the year; and yet they are commonly in rags, and without a dollar in store. Many species of mechanics earn from two to four dollars per day; but they lay up nothing in a general way. Cotton spinners earn ten dollars per week—glass blowers, \$120, or more, per month.

On the whole, “the scheme of Saving Banks is calculated to secure independence without inducing pride; to lead to temperance, and the restraint of all the disorderly passions which a wasteful expenditure of money nourishes; and to produce sobriety of mind and steadiness of conduct, which afford the best foundation for the domestic virtues in humble life. The effects of such an institution as this upon the character of the people, were it to become universal, would be almost inappreciable.”*

Since the above remarks were written, Saving Banks have been established in Philadelphia, New York, and Boston, the

* Third Report of the Society at Edinburgh, for suppressing beggars, relief of occasional distress, and encouragement of industry among the poor. 1814.

regulations for which may be consulted by those who wish to imitate such good examples; and also the "Pamphleteer," vol. 7, for an analysis of those of the various British Saving Bank associations. One rule ought to be observed: to make them as simple as possible.

The following table, taken from a series of papers on the subject, in a Philadelphia paper, will "show at what rate the weekly savings will increase at a compound interest of 4 per cent. per annum."

Weekly Savings.	Will amount in 3 Years.	7 Years.	12 Years.	20 Years.
\$0 25	40 56	102 67	195 37	387 12½
0 50	81 12½	205 33	390 62½	774 25
1 00	162 25	410 66	781 25	1548 50
1 50	243 37½	615 99	1171 87½	2322 75
2 00	324 50	821 32	1562 50	3097 00
3 00	486 75	1231 98	2343 75	4645 50
4 00	649 00	1642 64	3125 00	6194 00
5 00	811 25	2153 30	3906 25	7742 50

W. N. a day labourer, has a wife and four children, and earns \$6 per week. It costs him \$3 50 per week to keep his family; he pays \$50 per year rent, his fire-wood costs him \$20, and clothes and other expenses \$40: so that his expenses amount to \$5 50 per week; and his savings are 50 cents, exclusive of what his wife can earn. This half dollar per week is in all probability foolishly squandered, in the greater number of instances; whereas if deposited in a Saving Bank, it would accumulate in twenty years to nearly \$800, by the table; and at 6 per cent. (which the Bank might afford to allow him) to about \$900—a sum which would afford comfort and shelter to him in the evening of life, and be far sweeter in the enjoyment than the most magnificent charity.

A. R. a drayman, in good business, and having a wife and two children, lives at about the same rate as the former: he can earn from 12 to 15 dollars (say 15) per week—deduct \$5 for keeping his horse, dull weeks, &c. and he can lay up \$4 50

per week: this sum would amount without interest in 20 years to \$4650. The probability *is*, that it would not with ordinary management reach *half that sum*. Deposited regularly in a Saving Bank, it would yield at four per cent. nearly \$7000, or a clear annual income of from 300 to 400 dollars.

A journeyman mechanic can earn from 7 to 8 dollars a week (say 7): suppose him to be 21 years old, and that he remains unmarried for 7 years—his board and washing will cost him \$3 per week, and all his other expenses need not be \$1 50 per week more. He will then lay up \$2 50 per week; which sum would produce in seven years, in the Savings Bank, at 4 per cent. above \$1000; and he would be possessed of an ample capital for establishing himself as a master workman.

(H. p. 28.)

A more particular notice of the objects to which a *Secretary of the Home Department* might, with infinite advantage, attend, may be useful. And, first, as to ROADS. Travellers have frequently remarked, (and some of them in terms not the most mild), the miserable state of the roads between the interior and the Atlantic States; and even asserted, that one of the worst roads in the country (at a time when it ought to be best), was that leading from the populous and wealthy city of Baltimore, to the seat of the National Government. In connexion with the subject of roads, it will be of obvious utility to acquire, by a correspondence with liberal men in Europe, and especially in England, the knowledge of the best mode of constructing roads; and when obtained, to publish it, for the benefit of the many hundred turnpike roads in the United States, not one of which it is believed has been constructed upon the best principles. An experiment of a few miles might also be made of a road formed upon the improved plan, in the District of Columbia, to serve as a model: and this would probably have more effect in inducing others to adopt it, than a general recommendation of a plan not tested in this country. It is understood that during the last few years, great improvements have been

made in the formation of turnpikes, and of these it is in our power to avail ourselves. Some publications have reached this country in the course of the last and present year, which show in part what has been done. The means of keeping the roads in repair; the prevention of the injuries to them, by regulating the weights of the carriages to the breadth of the wheels, (an essential point), and the most easily managed and economical weighing machine to prevent deception, and to be stationed at certain toll gates. should of course demand a portion of attention.

The introduction of useful implements of agriculture; of labour saving machinery; of useful arts, and ingenious mechanics from Europe, would be an important part of the duty of the new officer. We every year hear of new and useful implements in husbandry, or of improvements in those already in use, which would be highly beneficial if introduced into the United States; but from the total want of intercourse between the cultivators of the soil in the United States and those in Europe, the improvements of either country remain where they were made. Indeed, were the existence of such foreign improvements or inventions known to our farmers, the difficulty and expense of procuring them, would constitute an insurmountable obstacle to their introduction. But if once introduced, and if models were sent to the different agricultural societies in the United States, they would be speedily brought into use, and would tend greatly to abridge the labour of the farmer. Several useful machines and implements could be mentioned, to which allusion is made. Among those of primary importance in the arts, I may mention the improved steam engine; the Nottingham loom, that weaves 24 pairs of stockings at a time; the improved mode of making white-lead, which renders unnecessary the health-destroying process hitherto in use; and the machinery of Mr. Lee, for preparing flax and hemp.

The improvements in the steam engine recently made in England, tend greatly to increase its power, and to economise fuel, the consumption of which, upon the plan formerly in use, was so

enormous, as greatly to detract from the profits of the manufacturer. On this subject I find the following note in *Tilloch's Philosophical Magazine*, for January, 1816. "According to Messrs. Leans' report for December, the average work of 33 engines was 19,333,126 pounds of water lifted one foot high with each bushel of coals consumed. During the same month, the work done by Wolf's engine, at the Wheal Vor, was 46,907,795, and that at Wheal Abraham, 47,622,040 pounds of water lifted to the same height with each bushel of coals."

The embarrassment and loss sustained by the defective steam engines employed in the water works of Philadelphia, have been so great, as to render one on the improved principle very desirable. Steam engines are applicable to the draining of extensive swamps, especially where they lie a great distance from the nearest outfall, and at the same time the land which lies between the low grounds and the outfall, is many feet higher; so that drains are obliged to be cut very deep, and to a great distance; and Mr. W. Walker, of Horneastle, in England, has published, (1812), an essay, showing, by means of tables, the number of acres that may be drained by different sized engines, with the prime cost, and annual outgoings; a work that will be extremely useful to all those who have occasion to employ them for the purpose.

Not only might the agricultural, but the manufacturing interests of the United States be materially promoted by the officer taking proper measures to procure, or encouraging ingenious or useful artizans to emigrate from Europe, particularly in those branches of business that languish for want of mechanics. Among others, I may mention one of great consequence, viz. earthen ware of the finer sort. Even porcelain could be made, as the materials for it abound in the United States; and some of them in the vicinity of Philadelphia. France and Germany impose no restrictions on emigration, and the ingenious artists of both those countries would be a great acquisition. Government, by means of such an officer, will have the power of becoming acquainted with the residence of ingenious men in the several arts,

sciences, and trades, and might become the depot of discoveries, and of specimens of every substance connected with the useful arts, which might in this way be essentially benefitted. Through him mechanics and artists of every description, who arrive in the United States, might know where to find the particular earth or material, of the qualities best suited to their respective purposes. The glass maker, in particular, might find where the proper materials for making his glass-pots were to be had—that great desideratum, and, as I am informed, powerful drawback on the profits of the manufacturers. Ascertaining also the particular minerals that have been discovered in different parts of the country, and their qualities, would aid and confirm the just notions of the practical miner, and check the projects of unadvised persons.* Already we possess the art of converting one of the materials of a turnpike in Maryland, (chrome), into the most brilliant yellow paint now known;† and due encouragement would lead to the discovery of fuller's earth, and pipe clay, (the exportation of which from England are prohibited), and other substances equally valuable.

A chemical operator should be attached to the proposed department, whose duty it should be to analyse all minerals sent to him for the purpose, in order to ascertain their composition; and when these are known, the qualities of the article, and its capabilities of manipulation, could be readily determined. And let me ask, in what way could 1000, or 2000 dollars, be more profitably employed, or with more honour to the Government? Such an assistant is always found connected with the officers exercising du-

* Mr. Godon was called about six years since, to examine the quality of copper ore, in Chester county, Penn. in working which, 50,000 dollars had been expended. He informed the proprietors that the same kind of ore had often been attempted to be worked in Europe, and always without advantage, owing to the difficulty of separating the iron from the copper, and advised the proprietors to abandon their works, which they were reluctantly compelled to do.

† The discovery of Mr. Godon; but the process has been since perfected by Mr. Hembel, of Philadelphia.

ties similar to those proposed for the new department, on the continent of Europe, and the Board of Ordinance, in England, also has its chemical operator. The losses which it is known have been sustained by the United States, for the want of such an assistant, would have paid an hundred times his salary, if one had been appointed at the establishment of the federal government.

The advantages derived by France from her ingenious men, mentioned p. 27, are summed up by Chaptal, in a paper read to the Nat. Institute, in 1815, on the manufacture of sugar from beets. For an account of the measures adopted in France to collect salt-petre, see "Archieves of Useful Knowledge," vol. 3, p. 353.

In fine, there is no calculating the quantum of benefit that may be produced from an officer of Government steadily directing his attention to every thing connected with the internal improvement of the country; or that would tend to foster that inventive spirit, or keep alive the industry and enterprise that prevail among the citizens of the United States. Let us only for a moment advert to the articles *gypsum* and *red clover seed*. What would have been said of a person fifty years since, when that precious mineral, and still more precious seed, were first introduced into Pennsylvania, if he had asserted that they would in less than half a century, add more to the real wealth of the state, by being employed in its agriculture, than if a gold or silver mine were to be discovered? Would he not have been called a madman, or have been set down as a visionary character, as Fitch and Rumsey were, when they asserted that boats could be propelled against the currents of our rivers by steam? Or, at least, such results would have been declared as improbable, as the spinning of two threads of cotton at once? Not only has the solid capital been increased by the increased exports of the animal and vegetable productions which have been multiplied, but, from the na-

* Dr. Franklin once predicted, in a company of several members of the Royal Society of London, that the day would come when this would be done: but they all pronounced the exploit impossible.

ture of the employments which such a large proportion of our citizens, and foreign emigrants arriving in the state, have been induced to adopt as a means of obtaining a livelihood; from the mills which ornament the banks of all our water courses; the machinery and numerous mechanics employed; the substantial farm buildings and dwellings, and other agricultural improvements; grand or substantial bridges and roads to which they have given rise; the increase of population; happy mediocrity of circumstances; abundance of food, for man and beast; and improvement of farm stock—that have followed the appearance and actual enjoyment of so much prosperity. And if such effects have resulted from bringing into general use only *one plant*, and *one mineral substance*, what may not be expected from twenty other plants being diffused over our states, in climates suited to their several natures, and by making the minerals of our country subservient to a thousand purposes in the arts, and domestic economy? What increase of comfort would not be enjoyed by the Southern planter, and the inhabitants of the Southern States generally, if only *two acres* of Guinea grass, and *avena elatior*, (or tall oat grass), were cultivated on every farm, from the milk, fresh butter, and the cheese they would enable the grower to furnish his family with, all the year? And yet I will venture to assert, that unless they are introduced by an agent of Government, half a century will elapse without the desirable measure being accomplished.—What capital, I may further ask, would not be saved to the nation by the general use of the excellent Benne or Sesamum seed oil, in place of that of the olive, in diet, in medicine, and in addition to that obtained from flaxseed, for numerous purposes in the arts?

It would be easy to proceed in the enumeration of the points to which the Secretary might turn his attention, or in detailing the advantages that would result to the country, from a faithful discharge of his duty; but I forbear on account of the length to which my notes have extended.

THE END.

NOTICES
FOR A YOUNG FARMER ;
PARTICULARLY ONE ON
WORN LANDS ;
BEING SOME RUDIMENTS FOR
AN EPITOME OF GOOD HUSBANDRY ;
AND SUBJECTS PROMOTIVE OF ITS
PROSPERITY.

Belmont, March 5, 1817.

DEAR SIR,

THE attempt at furnishing materials for a compend of some of the most useful practices and arrangements in husbandry and rural economy, suitable to our local circumstances, herewith sent, was intended for our Almanack; to which I was requested to contribute my share of assistance. But it was conceived, that the narrow limits indispensable for that Publication, would not admit of this addition; and I gave over all thoughts of offering it for any other purpose. I had not sufficiently attended to the classification of subjects; having, as they arose, written down such ideas as occurred to me, without the regularity which ought to be observed on all subjects comprehending a variety of matter. The Society having determined to publish another volume, I now request you to present this collection, imperfect as it is, for consideration. If better materials for the Volume, are not in plenty, it may be used to supply deficiencies; or returned to me, as the Society think proper to direct.

Very sincerely yours,

RICHARD PETERS.

*Roberts Vaux, Esq. Secretary to the Philadelphia
Society for promoting Agriculture.*

THE President's Epitome of Agriculture having been read, it was resolved, unanimously, that it be printed, in the Fourth Volume of Memoirs.

Extracted from the Minutes.

ROBERTS VAUX, *Secretary.*

CONTENTS.

- I. *Farm Yard*, to be laid out on a good plan. Water introduced, and stock confined.
- II. Yard to be stored with all attainable putrescible substances; to be mixed with the *dung* and *urine*, in a *pen* or *stercorary*. Valuable qualities of *urine*. *Night soil*.
- III. *Fall ploughing*; its advantages. *Corn-grub*, or *Cutworm*. *Soddy grounds*; how to treat them. The *Roller*, and its uses. *Farm well*, on a small scale, rather than extensively and negligently. *Hessian Fly*. Mix *earths*, and plough in *green manures*. *Composts*.
- IV. *Lime*; when, and how profitably applied. *Indian corn*; modes of planting. *Rotting* or *decaying* the *sod*. *Harrow* preferred to the plough, for cleaning and dressing corn. Some remarks on southern farming.
- V. *Stable* and *Yard Manure* to be *ploughed* in. *Dung*; remarks on it, and opinions as to the state in which it is most beneficially applied.
- VI. *Deep ploughing* in breaking up. *Sorrel* and *sorrel line acid*. *Foul* or *wet fallows*. *Chaff-bearing crops*, not to succeed one another. *Oats* cut for hay, or sown for pasture. *Oats* and *Indian corn*, for soiling. *Vetches*. *Heligoland Bean*. *Thistles* ploughed in. *Fences*. *Timber*. *Line Fences*.
- VII. *Change of crops* recommended. *Harrowing winter grain*, in the spring. *Plants* should be accommodated to the *soil*, rather than the *soil* to the *plant*. *Food of plants*; diversity of opinions concerning it. *Changes of Forest Timber*. Mr. *Knight's* theory as to *ages* of trees. Repetitions of same species of grain, or grass. *Clover* fails, after frequent repetitions. *Seed shallow*, however deep may be your breaking up.
- VIII. *Plaster* old fields for pasture, and subdue *Weeds*. Some remarks on *Plaster*.
- IX. ORCHARD GRASS; its value, and advantages over *Timothy*, or *Clover*. Remarks on its culture, and seed. *Poa viridis*, or *Green Grass*. *Fiorin Grass*. *Poisonous Plants* to be eradicated. *Botany*; its uses in farming.
- X. *Explorations* for *Earths* as *Manures*. Apparatus for *analyzing soils*. Uses of *chymical* and *mineralogical* knowledge to a farmer. *Jersey pyritous Earth*. *Water* to be applied to all its uses in husbandry. Advantages of some knowledge of *practical surveying*, *hydrostatics*, and the *mechanic powers*. *Miscellaneous duties*.

CONTENTS.

- XI. *Casual failures* should not discourage confidence in a general rule; nor controversies about theories, prevent perseverance in good practices.
- XII. *Summer Dung* to be collected; and how to be treated. *Hotlime* injurious, and some remarks on *Dung*, and its state of fermentation.
- XIII. *Winter Grain* subject to injury, when sown the first year of *liming*.
- XIV. *Selection and change of Seed*. *Crossing* meliorates *Grain* and *Fruit*. *Quantity of Seed* to an acre. Variety of opinions concerning it. *Drill Husbandry*; and sowing in drills. *Plaster* sown on winter *Grain*. *Hessian Fly*; some remarks on it, and some guards against its injuries; *Wheats* believed to be capable of resisting them.
- XV. *Steeps*. *Mildew* and *Smut*. *Stunted or Sedge Wheat*.
- XVI. Carefulness in raising and expending *Food for Farm Stock*, recommended; and modes of treating several kinds of food and provender. *Chaffing Hay*, *Straw*, &c. *Steaming Potatoes*. *Scarcity Root*. *Boiling or scalding* Provender. Culture of *Potatoes* previously to a *Wheat* crop; different opinions concerning it. *Potatoes* said to grow best on boggy grounds. *Veterinary* knowledge, and *Weights and Measures*; their uses even in the orderly and more beneficially feeding of stock.
- XVII. *Soiling*; some remarks on. *Pens* for cattle and sheep.
- XVIII. *Fire on Soils*; its uses, and observations thereon.
- XIX. *Ditching and draining*. *Warping*. *Irrigation*. *Stagnant Water* injurious, if not carefully attended to.
- XX. Discretion, as to the *numbers and species of live stock*, recommended, and judicious selection of *breeds*.
- XXI. *Dogs* to be trained discreetly; to prevent bad habits; and especially in regard to *sheep-killing*. Carelessness in those who leave temptations in their way, a principal cause of this propensity.
- XXII. *Farm dwelling-houses*, and other buildings; observations concerning them, and the situations in which they are placed. *Stables* for horses and cattle. *Pens for swine*, and mode of feeding them. *Cleanliness* as to all places in which live stock are kept, recommended.
- XXIII. *Accounts* of receipts and expenditures, and *Notes* of farming occurrences, to be kept.
- XXIV. *Reading* on agricultural subjects, recommended.
- XXV. *Experiments* useful and necessary; but settled practice should not be disregarded. *Profits* of farming; observations respecting them.
- XXVI. *Poultry*.
- XXVII. *Farming instruments, implements and tools* to facilitate agricultural operations: Some observations respecting them.
- XXVIII. *Agricultural Societies*.
- XXIX. Habits of *Industry*, *Economy*, and *Sobriety* inculcated. *Savings Banks*. *Friendly and Benefit Societies*. *Lancaster Schools*.
- XXX. Conclusion; and general observations.

NOTICES
FOR A
YOUNG FARMER ;
PARTICULARLY ONE ON
WORN LANDS ;
BEING SOME RUDIMENTS FOR AN
EPITOME OF GOOD HUSBANDRY ;
AND SUBJECTS PROMOTIVE OF ITS PROSPERITY.

I. You cannot be too careful in forming *the plan* of your Farm-Yard ; (the magazine and laboratory of your principal stores for artificial fertility,) calculated ultimately for your improved farm. But begin with such parts of your farm buildings and accommodations as suit its present state of culture ; and add such conveniences, as circumstances, from time to time, require.

If no water be in your yard, dig a well, promptly ; and confine your stock from November to May ; never permitting them to wander after water, the provender of the stalk-field, or the miserable fogge of other fields ; in which they empty themselves, gain little nourishment, and uselessly scatter their dung ; the fertilizing qualities whereof, are thus given to the winds ; and only a dry and inert remnant left, for future benefit. The stalks and husks of Indian Corn, should be brought home for feed and manure ; instead of being wastefully browsed, and trodden down, by wandering cattle. Let not a hoof, unnecessarily, leave your yard, or stables ; not however, neglecting to give them proper exercise, within the enclosure, or if out of it, let them so remain only during the time employed in such exercise ; or in the services required from them.

II. Hale into your yard, a sufficiency of every putrescible substance, within reasonable distance ; and often clean up your muck. Have a pen or stercorary of solid masonry, with its bottom paved, or composed of sound and well compacted clay. Your manure gathered into your pen or stercorary, should be secured against the treading of cattle, which, by excluding air, prevents the necessary fermentation ; a reasonable degree whereof is essential, although when excessive, it should be checked. Sir H. Davy's discussion on this subject, shews one side of the question ; and experience must teach the other. Mix *Earth* with your fermenting litter, or muck, rather than *Lime* ; until the fermentation be sufficiently advanced. If your stercorary be roofed or thatched, it will be the more perfect. Have pits, secured from leakages, to collect the drainings of dung ; and the urine of Horses and Cattle ;—the most valuable excrements. Human urine is also surprisingly beneficial ; and generally, (as it regards rural economy,) wasted. Prejudice and ridicule are alive, when it is asserted, that it is preferred by Horses and Cattle to *Salt* ; and is, to them, salutary as a medicine, as well as a condiment, promotive of health, and consequent profit.* Our Germans have been long acquainted with its uses ; and a late publication in England, shews its powers and efficacy, as well for domestic Animals, as for fertilizing the soil ; when diluted, and judiciously applied. Immense collections of it might be made ; not only in Cities, Towns, Inns, and Manufactories, but on every Farm. *Human Ordure*, or *Night-Soil*, however contemptuously regarded by us, has been long

* Many years ago, a German woman kept Cows, in a town in Maryland ; and derived a plentiful support from the sale of Milk, Cream, and Butter. Her Cows were remarkable for their goodly appearance ; and every body preferred dealing with her, to being supplied by other Cow-keepers. Envy was excited ; and she was narrowly watched. At length it was discovered, by her rivals, that she daily emptied the contents of the Urinal, into the food of her Cows. She acknowledged this to have been the magical cause of the superiority of her Butter and Cream. But when the secret was discovered, she could sell no more of the celebrated articles, which had heretofore been so universally admired. It is only by stealth, that such prejudices can be prevented, or subdued by a conquest over the imagination.

used in Eastern Countries, as the most valuable manure. In some parts of Europe, it has, for some time past, become an object of attention. Its offensive qualities are readily corrected by lime.

III. Plough and harrow soddy fields in the fall ; and add *Lime*, harrowed in at that season, if it be within your power. In addition to other advantages of this operation, you will thereby escape, either wholly, or for the most part, the annoyances of the *Corn Grubs*. In what mode the destruction of the grubs, or the eggs of their parent, (be it a Beetle, or what it may ; for on this subject, there are varieties of opinion ;) is, by these operations, accomplished, or their ravages prevented, is a subject of laudable curiosity and speculation : but the fact of the purpose being achieved, is all important ; and in numerous instances, incontestably proved. That spring ploughing is generally inefficacious, is too frequently and fatally known. Instances of failure to produce the effect mentioned, by fall ploughing, have been adduced. On examination into the facts of some, it is found, that the operation has not been performed either well, or in due time, and only partially ; and in other cases, either uncommon grub years, or other peculiar circumstances, have occurred. The great balance of facts is, most assuredly, favourable to this practice ; and warrants its adoption. It is so beneficial in other respects, that it should be followed, even without regard to its effects on the grub. Some acute diseases defy common remedies ; and dams and mounds resist common floods ; yet yield to extraordinary inundations. Nevertheless, medicine, and medical skill, and preventives of overflows, should not be set at nought. Nor should any beneficial operation in husbandry be disregarded, because it does not in every instance succeed.

Fall ploughing enables you to plant corn early : and it is better thus to risk spring frosts ; which do less injury to your plants, than do early frosts, in autumn, to the corn fully grown.

It is alleged by several highly respectable farmers, that, in holes made near the hills, with a pointed stick ; incon-

ceivable numbers of grubs have perished. In a letter to the Society, on the information of one who actually experienced the fact ; it appears, that, by a ditch dug for the purpose, across a field ; the passage of Cutworms from a field which had been destroyed, to one uninjured, was obstructed : and six bushels of grubs were thus collected. This would seem indubitably to prove them to be migratory ; and to shew the consequences of leaving part of a field unploughed in the autumn ; which affords harbour for grubs, which may from thence wander over the fall ploughed portion. Several farmers have escaped the grub, by steeping the seed corn in spirits of turpentine ; and rolling it in plaster.

Soddy grounds should be *rolled*, and well harrowed, in the direction of the furrows ; after being broken up so deeply, as to place beyond vegetation, the sod ; and by thus excluding air, and by clean, shallow, and frequent stirring, so as not to disturb it, to promote its decay without a capacity to grow. The dead fibres, (nature's restoratives,) are thus retained in the soil, for appropriate manures.—Lime, Plaster, Marle, &c. to co-operate with. The sod left on edge, either dries uselessly, or vegetates, with all its pests.

The *Roller* is too little used ; and, mistakenly, supposed to consolidate too much : whereas it crushes and separates clods, and loosens the soil. On clay and heavy ground, the *Spiky Roller* is best ; as it is on all hide-bound surfaces—of meadows and mowing grounds particularly ; but, like all other operations, rolling must be performed judiciously, and adapted to soils and circumstances. Few, indeed, are the soils, on which it is not highly beneficial.

Sow no more ground, with winter grain especially, than you can perfectly till and manure ; one well dressed acre, being worth many negligently treated. Manure, good tillage, and late sowing, which latter is only justified by the two former, are guards against the *Hessian Fly*. If even to good farming, misfortune occurs, losses are not accompanied by self reproach. Shed Oats, or that grain sown with the wheat, sometimes attracts the Fly, by its being more forward and tempting ; for this insect has no predilection for wheat,

although our interest in this grain, induces our peculiar attention to its misfortunes ; but, like Radishes sown with Turnips, success does not always attend the experiment, though well worthy of trial.

If you cannot get Lime, or Animal manure, *mix Earths* of different qualities and textures, or plough in *green Manures* ; such as Buck-wheat, clover, &c. Turn them in deep, to prevent evaporation in gases ; which would occur in Summer fallows, superficially ploughed.

For Composts, move old fences, and plough up their scites ; thus destroying hedge-rows, and other nuisances ; and mix tussocks, weeds (cut before going to seed,) and all putrescible substances, in long and low beds, to be turned by the plough. Go into your woods, and compost leaves and wood-soil ; also use mould from low places, washed thither by rains and floods ; and throw out the beds of stagnant ponds. *Lime* with the latter, is beneficial, and plaster operates wonderfully with the former, on the decayed vegetable matter ; as do *ashes*, on pond or river-mud. *Plaster*, in compost in which vegetable matter is mixed, is more beneficial than *lime*. Whether *salt* be or not a manure, is not well ascertained ; but it has had success in *small* quantities. See 2 vol. Philadelphia Memoirs, p. 173, 4, 5, 7. The *Chinese* make much use of *sea water* as manure, on lands near their coasts ; and those in the interior, scatter salt over their fields ; before they are tilled. The same practise is pursued in *Hindustan*.

IV. You gain a season in the wholesome efficacy of *lime*, by spreading and harrowing it well in, on your fall-ploughed fallows. Its causticity is thus mitigated or destroyed, by winter exposure ; and you may the more safely use dung, the ensuing season, for your crops, without danger of injurious effects from hot lime.

If you plant Indian Corn, on either fall or spring ploughed sod-fallow, (or any other) deeply tilled, (and it is the most desirable and cleaning crop,) plaster the hills—as they are technically called—or sow the gypsum over the whole field ; and some do both, after the plants are sufficiently forward. The seed should be wetted and rolled in plaster, or steeped

in a decoction of Hellebore or Copperas ; or, what produces surprising effect, a strong solution of Salt-petre ; but do not soak or steep it too much. In dry weather, the germination is accelerated, by the steeping, injuriously ; so that the plume and radicles perish ; and in long wet seasons, they rot. The sed having been broken up 5 to 7 inches deep ; or if more, the better ; requires shallow planting. If it be cut with a coulter harrow, the better the crop will thrive. Being unturned, the sod becomes of itself a manure. Although it may not entirely rot, its incapacity to vegetate is insured ; and the soil is left filled with decayed vegetable matter, auxiliary to the corn product, and a pabulum for appropriate manures. But frequent harrowing must not be neglected ; whether you shall plant in squares or drills, and at what distances ; depends much on the state of your field, the nature of your soil, and not a little on opinion ; which varies much on this subject ; and is frequently operated upon by success, in the mode which happens to be fortunate. Some have spoken favourably of planting Corn as early as it can be well got into the ground ; and they do not fear the annoyance of late frosts. It might by this means be vigorous enough to resist the Grub, or grow after being cut off by them. Some have succeeded in planting late, so that the Cut-worm is passing away before it starts. The first mode is more secure from early frosts in the autumn.

Unless its situation and circumstances forbid, lay your Cornfield level, rather than in ridges ; that moisture, in light soils especially, may be retained, instead of passing away ; and, if necessary, draw water furrows, to carry off accidental flooding, by rains, or other causes. Cleanly farming is essentially necessary, with the hoe and common harrow, to prevent grass and weeds from growing ; and to assist in rotting the sod. Use the plough little, if at all ; and the harrows much. Ploughing up furrows to the Corn plants, is an impediment to the harrowing culture, carries off moisture from the plants, exposes the accumulations of earth soon to dry through, and is worse than useless. If you *must* ridge low and wet soils, still the hoe and common harrow should

be diligently used. Pulverize your ground, and the plant will be nourished and supported by the length and vigour of multiplied roots ; and never require hills, or elevated furrows.

It being the intent of these Notices, to *recommend*, not to *dictate* ; it is deemed proper to mention, that Col. Taylor, of Virginia, (and his practice is followed by many southern farmers,) pursues a mode of cropping with Indian Corn, directly the reverse of the one herein recommended ; and an account of it may be seen in his *Arator*. He breaks up, however, deep ; lays his fields in high ridges ;—possibly, his soil and surface may so require,—in a north and south direction ; burying his coarse, (corn-stalk) manure, to rot in his soil ; and in succeeding Corn crops, after a lapse of some years, the rows are planted over the former deep furrows ; the crowns of the new ridges, occupying the places of those furrows. Many pursue his practice, and speak favourably of it. To us, who prefer laying our fields level, for the scythe and grazing, this mode would not be eligible. It may in some soils, as it regards the culture of the Corn crop merely, have its advantages. It resembles in some particulars, Mr. Gregg's practice, on a wet heavy soil, mentioned in our 2d. volume. Col. Taylor's plan may be seen in his Essays on the subject. In this mode deep ploughing is essential ; and it is as much so in the level culture ; for, with shallow ploughing, moisture would soon evaporate ; though not so much as if ridged, and a greater surface exposed to drain and dry. Many who prefer ploughing in grain, lay their fields in broad lands, and harrow, after ploughing in.

Wheresoever the harrow has been fairly tried, its advantages over the plough, in the Corn crop, have been decisively shewn. Corn in drills, on a sod deeply ploughed in, the rows 4 feet apart, and the plants 18 inches asunder, and thereafter entirely cultivated with harrows, has produced crops, beyond the belief of those wedded to the old mode of culture. Some have found great advantages in the culture of Corn in wide rows ; and potatoes, well manured, drilled between them.

It is evident, that this and other modes of practise herein mentioned, are calculated for farms of the extent deemed competent in our part of the Union; where permanent cleanliness, and valuable covers of grass, for hay and pasture, are contemplated. In southern sections, where the mere grain crop is the object, and vast extent of surface occupied; so that numbers of acres are multiplied, to produce an aggregate, which might be had from a few; such details of operations for dressing and cleaning the soil, although highly assistant to the immediate crop, would be considered inapplicable and unnecessary. But until, in those districts, some such practices as are used in less extensive husbandry, are more commonly introduced, landholders should not complain of broom-straw, and other noxious pests, overrunning and sterilizing their worn and finally abandoned fields; urged on their march to poverty, by *double cropping*, and rough farming. Great advantages might, however, be now taken of former mismanagement, by pursuing some such means to recover waste and abandoned lands, by using the spontaneous growths of scrubby timber, first for cover, after felling, and then burning it; as Col. Taylor has practised. See 1 vol. Philadelphia Memoirs, pages 32, 8, 9. He has not only set an encouraging example for farther experiments; but has afforded the strongest proofs of the benefits resulting from *cover and fire*, on soils. From experience in the like experiment, it could be shewn, that his cover remained unnecessarily long unburnt.

If the numbers of Slaves are burthens on the southern landholders, in the farming districts; confining their attention to a better style of agriculture on a smaller scale, would relieve them. If emancipation or colonization be prudent and practicable, those emancipated or colonized, might be spared; when fewer labourers were required in improved husbandry. If less land were occupied in exhausting culture, there would be a surplus, for a white population to cultivate to greater advantage. The improved state of the husbandry in some of the counties of Virginia, particularly *Loudoun*, is an example of peerless value. The plaster and clover culture has pro-

duced there, almost magical effects. Deep ploughing is much practised.

If you cannot *lime*, for the *Corn crop*, in the autumn, let it be done early in the spring. The harrows mix the lime with the soil, and should be frequently at work. Be not afraid of cutting the Corn roots ; they send out fibres from the severed parts, which more than supply the deficiency occasioned by excision. Sucker your Corn, and do not sow winter grain among it—to the injury of both crops, as well as your land. Of all your crops, Indian Corn will the least bear neglect, and it amply rewards all your attention. It is not only the most valuable, take it with all its advantages, but it is, of all crops, generally the most certain. If it fails, some most uncommon seasons or circumstances occur. We call it *Corn*, without its specific designation, for its pre-eminence. It is the best crop to subdue a stubborn, or clean a foul, soil. It forces you to farm well ; which counterbalances its exhaustion, in a very important degree.

V. *Plough in your Barn-yard or stable manure.* In what state *dung* should be applied, is a disputed question. Some plough it in, at an early stage of putrescence, and some when it is more advanced. The middle course is, perhaps, the best. To scarcity or other tap-roots, fresh dung is decidedly hostile. But the adverse opinions on this subject, as to other crops, are too diffuse, to be here inserted. You will find them in books ; but the best lessons are to be gained from your own experience. Your well rotted compost, is indubitably best, for top dressings, on either grain or grass. Yet fresh dung, as a top dressing, has its advocates. It is even believed by many, that using dung by itself, is wanton waste : and that it should be considered only as an ingredient, to give value and activity to other materials in composts. Much more apparently improbable revolutions in rural economy, have come to pass. Intelligent Farmers hold opposite opinions. See, in *England*, Mr. Gregg's practise ; 2d vol. Philadelphia Memoirs, 71, 72 ; and Col. Taylor's *Arator*. Read Sir H. Davy's Discussion upon this subject, and judge for yourself. See also, in Sir J. Sinclair's *Tour through Flanders*, 1815, an ac-

count of the practice of the *Swiss* Farmers; who soak their dung in water, and apply it in a liquid state, to far greater advantage than crude dung.

The nature and qualities of soils, and the kinds and description of manures, have influence, no doubt, on opinions and practice. Climate and seasons have also their operations on manures. The most general opinions and practise, favour the use of *moderately rotted* dung.

VI. *Break up deep*, and be not afraid of turning up barren soil; when the nature of your ground admits of this operation. Shallow ploughing up the *vegetable mould*, deceptiously serves a turn, when it is not exhausted; and its exhaustion is the certain consequence of this ill-judged tillage. But the *air* contains the principal store of materials for the food of plants; and will impregnate the substratum, if exposed a due length of time; especially in winter, when it receives much, and parts with little; the heat of the sun, being then feeble, and incapable of dispelling what the soil receives from the air. Those who object to *deep*, much more to *trench* ploughing, want experience, sufficiently to test their benefits. They have mismanaged experiments, or have been in too great haste to crop their grounds. The substratum must be exposed, for a time necessary to receive the influences of the atmosphere. Indian Corn, with lime, is by far the best crop, after *trenching*, particularly: because it requires the soil to be constantly stirred and exposed. True, there are some soils, which neither deep nor trench ploughing will benefit; and every Farmer should accommodate his practice to the nature and qualities of his soil. Over cropping and shallow ploughing, with exhausting crops in succession, frequently cause overwhelming growths of *Sorrel*, to infest ill managed fields. *Lime* is the only remedy: and you will see in Lord *Dundonald's* "*Connexion*," &c. the good effects of lime; which destroys the sorrel, and produces the *sorrel line acid*; highly friendly to wholesome and profitable vegetation. *Green sorrel* grows on fertile soils; but the *red sorrel* is a certain mark of sterility.

Never sow a foul or weedy fallow, to save a ploughing; or

a wet one, to save time : nor sow, or stubble in, one chaff-bearing crop, immediately to follow another. Such farming may succeed for a time, under particular circumstances ; but in the end it will produce only a crop of regret.

If you are deficient in mowing grounds, Oats may be sown on your fallow, and cut for hay, before ripening the seed ; and in such case they do not exhaust ; nor does any plant, in this stage of its growth. And see Mr. W. *Young's* paper on the great advantages of Oat-pasture. 2d vol. Philadelphia Memoirs, 186. Oats and Indian Corn are sometimes sown together, in broad cast ; and cut for soiling, or to be ploughed in, as green manure. It is difficult to dry them, for winter provender. Thistles, or other succulent plants ploughed in, fertilize wonderfully ; when left long enough to ferment, and become putrescent.

If any covering crop, for summer fallows, which does not exhaust like Oats, could be suggested, a great reformation would ensue. *Vetches*, or some such plant might be substituted, if the culture were better understood. The *Helegoland* Bean, very productive, is now esteemed, in *England*, as a cleaning crop, to precede Wheat. A spring cover of *Pease*, of a species ripening in time, is very beneficially used to precede wheat, in the autumn. If the pease fail, and the crop is likely to fail, they may be ploughed in, as an excellent green manure.

Keep good *Fences*, and make and repair them, when other business is interrupted. They not only secure your own crops, but ensure the good will of your neighbours ; by preventing teasing contests. Let no weeds, or nurseries for pests, remain near them ; and avoid throwing stones, or other obstructions to the scythe, on the edges of your fields, or mowing grounds. They prevent cleaning their borders ; and afford opportunities of growing, to noxious weeds and other pests ; forming, finally, scrubby hedge rows, to disgrace them.

Be avaricious of your **TIMBER** ; and fence your wood lands, to protect the young growths. Waste and negligence in this all essential article, soon produce irretrievable want.

LIVE FENCES are becoming more and more indispensable :

and those composed of the Newcastle Thorn (*crataegus crus galli*,) will be found the best, for hardihood, durability, constant verdure, and numbers and strength of the thorns. Live fences, as well as orchards, and all fruit-trees, demand the earliest attention; and will be growing into profit, whilst other improvements are progressing. If to the ditch and mound faced with stone, which many deem the best, (because it affords immediate protection both to your hedge plants and to your field,) you prefer plain hedging; cultivate strips along your hedge, from year to year, well manured, and plant potatoes; and your thorns will thrive luxuriantly. In a few continuations of the potato culture, you will gradually reach and invigorate the whole extent of your hedge. Let no person begin a hedge, who will not nurse and foster it, in every stage of its growth.

VII. CHANGE YOUR CROPS, and be satisfied with a good one on a small surface well prepared; taking a pride in clean and neat farming, rather than wasting your labour and means, in extensive, slovenly, and ill requited culture. Harrow your winter grain in the spring, in the direction of the seed furrows, or drills; and be not afraid of disturbing a few plants; manifold produce will remunerate for the few destroyed. The cracked and baked surface is thus pulverized; and the harbours for insects broken up. See Philadelphia Agricultural Memoirs, 3d vol. 24, 50. The wheat plant throws out sets of roots in the successive stages of its growth; and most requires loose earth, in its infancy.

Accommodate your plant to the soil, in preference to fitting your soil to the plant; every plant requiring a peculiar attention to its own habits and organization. The Author of Nature has placed in their proper element, both plants and animals; and they are suited to their designated positions. Sand or rock plants perish in clay or rich soils; as do those calculated for fertile ground, in sand. See a valuable Essay on this subject, 14th vol. Bath Society Papers, (1816,) page 136. By a careful attention to the facts and principles developed in this Essay, apparently barren sands and sterile clays, may be made to produce profitable crops of appropri-

ate plants. Our sea coasts, on their dreary sandy or pebbly beaches, might be filled with the *Marine Pea*; which will grow, in defiance of the surges, spontaneously, after the first seeding; and produce perpetual crops of nutriment, for horned cattle, sheep, and swine, either on sea coasts, or the borders of lakes. The *trifolium maritimum*, (sea Trefoil) would grow luxuriantly in salt marshes; and take the place of the inferior vegetation now occupying them. Many more instances, to show the principle, might be added. The *Tussilago*, or Colts-foot, delights in meagre soils; and making them rich, especially with dung, will kill it. It were to be wished, that our wild garlick were thus vulnerable. Meagre soil, of any texture, cannot equal that naturally fertile, in the production of any plant; but manure operates with double efficacy, on a plant in its proper soil. Nor is it intended to say, that, in all cases, changing a plant from a worse to a better soil, (avoiding extremes,) is otherwise than salutary; for some plants are thereby improved. But such plants must not be those exclusively calculated for particular soils. *Wheat* is, fortunately, a plant capable of being indigenated in any soil or climate; yet of this grain, there are species growing better in some, than in other soils. There are wheats for sand, and wheats for clay. The grasses (commonly so called,) have varieties, strikingly adapted to appropriate soils; and such peculiarities should be carefully studied.

It is not intended to enter into the questions—what is the food of plants? and whether particular soils are more than others, furnished with the pabulum for the plants natural to them? and whether every plant requires specific food; which being exhausted, degeneracy or death ensues? The general opinion seems to be, that all draw their nourishment out of a common magazine, in the air and the earth; the organs of each being formed to draw the sustenance peculiar to it; and most of this, from the air. Such questions are unsettled; various opinions being entertained concerning them. The changes of timber and plants in our forests, were mentioned as indications of nature, that our crops should be changed. Most unwarrantable imputations have been cast on the writer

in the Philadelphia Memoirs, who communicated the circumstance now known to every body, as if he believed in a new creation, or in equivocal generation; than which nothing is more groundless and untrue. See Philadelphia Memoirs, 2d vol. p. 358. Theorists “bear, like a Turk, no brother near the throne.” But the facts were barely related, and no Theory was attempted to be established.

Mr. *Knight's* Theory, tested by strong facts, is now much credited; although at first received with great opposition. He alleges, that Trees have their respective *ages*; beyond which the race becomes extinct. On fruit trees, many experiments seem to prove this idea correct. Grafting or budding from old trees, is now abandoned; it being asserted, that the one thus propagated will endure no longer than the allotted age of the parent tree. This subject is elaborately treated, in British publications; with which the curious inquirer may amuse, if not instruct himself.

The same kind of grain has been sown, in long succession, in several instances. But these, being exceptions to general experience, should be considered as anomalies. *Clover* fails after frequent repetitions; and the Europeans interrupt the successions of this grass by sowing *Tares* and *Vetches*. After such interruptions, clover may profitably again take its course, in the rotation. And thus it will be, with any other plant.

Whatever be your change of crops, good farming should be invariable. Wheat or barley on worn lands, without good tillage and manure, will not repay the expense of culture. However deep you plough, *seed shallow*. The coronal roots are formed near the surface, and the plume and radicles perish; in whatever depth the seed be deposited. The harrow lays your field more level and fit for a cover of grass, than the plough; and, on this account, many harrow in their grain, in preference to laying their fields in elevated lands; which, unless your soil be wet and low, are unnecessary. But care must always be taken to draw furrows, as drains; where water would be likely to remain, and drown, or scald, your plants. A great advantage derived from harrowing in grain, is, that after your field is prepared for seeding, you can ra-

pidly sow and harrow in your seed ; and have *the choice* of weather, and other circumstances ; which the more tedious process of ploughing in your seed would not permit. The last ploughing may be in broad furrows, as deep as those desire, who plough in their seed. This mode is equivalent to *their* practice, and has the additional advantage of the harrow. The idea of *clods* mouldering in winter, and protecting the plants, and laying *deeper hold* when grain is ploughed in, are excuses for bad culture. Pulverize your soil, and draw furrows for drains when necessary, and the plant will root luxuriantly ; and want no clod-mouldering.

VIII. PLASTER YOUR OLD FIELDS ; which, being full of decayed and inert vegetable matter on which the plaster acts, will throw up pasture, until you can cultivate them in course. We are not yet perfectly acquainted with all the properties of plaster. The general current of facts prove, that salt and salt air, are hostile to its operations. And yet there are instances where it has succeeded on our sea-board, as well as on farms remote from our coasts.

Subdue weeds and other pests in the fields thus plastered, and all others, by the scythe and as much hand weeding as you can afford. Weeds are your deadly foes ; but, in the compost heap, they may be converted into friends. Whilst overrunning your fields, they are robbers of the food which would supply wholesome and profitable plants. The expense or labour of eradicating them, is far more formidable in contemplation, than in reality it will be found.

IX. SOW ORCHARD GRASS : if in the autumn, harrow it in with your winter grain. Some prefer sowing it in the spring. Much depends on the soil and season ; and you can try both modes and periods, to enable you to form the best opinion. This grass will be permanent, when *clover*, (with which it is a profitable companion,) fails. It is, on uplands, preferable to *Timothy* ; which is a great exhauster,—yields but one crop of hay, and little or no pasture, on dry soils ; thus leaving the field bare of cover ; and exposing it to the exhaustion of the sun and winds : whilst orchard grass, by its quick and repeated growths, affords a ceaseless cover and defence.

By thus recommending *Dactylis glomerata* for permanent pasture and hay, it is not intended to cast the least reflection on the clover culture. This is now so commonly practised, and its uses so generally acknowledged, that it is unnecessary to dwell on its excellent properties. But the clover is fugacious; and the orchard grass, sown with it, endures in uninterrupted vigour and usefulness, when clover, in dry seasons particularly, is burned or shrivelled; or has entirely departed; having lived out its short period of existence; or having been prematurely destroyed by frosts; to which it is often a victim. The clover and plaster are so congenial, and the improvement of the soils suitable for them so universally known, that any detailed notices of them would now be superfluous.

Raise your own orchard grass seed; and do not spare it on your fields. Thin sowing throws up tufts, detached and coarse. You buy, in the shops, much chaff and little seed: insomuch that a bushel weighs only from 14 to 16 pounds, at best; and some much less—barely sufficient for an acre. It should be sold by weight, and not by measure. No grass seed can be raised more plentifully and cheaply; and yet the expense of purchasing, has deterred its more general use.

It will be difficult to keep an old weedy farm long in grass; and the plough must, therefore, be oftener used than a clean farm requires. Yet, with composts as top dressings, and destruction of weeds, wonders may be performed in a *grazing* system. But when the old sod is broken up, *time*, as well as good husbandry with proper courses of crops, must be afforded. No winter grain should be sown, the first season of breaking up old grass lays. The stirring and culture of that and the ensuing year, are necessary to ensure the complete destruction of weeds and other unprofitable vegetation.

If you should be so fortunate as to conquer weeds and pests, and obtain a clean cover of the *poa viridis*, or green grass, which will not grow unmixed in all soils; it is not to be told, how long your fields, with top dressings, will continue without being disturbed by the plough; if scarified, when surface bound, by a proper instrument. This grass

appears to be native, though not peculiar to this country ; and it must, according to general experience, grow spontaneously.

Plants spring up in soils in which they are indigenous, without previous seeding. The experiment of cleaning by tillage, and meliorating by manure, worn lands, and suffering them to throw up grasses spontaneously, has decisively succeeded, so as to ensure valuable crops of the appropriate kinds ; which finally establish themselves, after contending with intruders for a time. *White clover* seems most universally native ; but *this* grows better in some, than in other soils.

Those who do not attend to the laws of nature in this regard, suppose that they can, *with plenty of manure*, force plants in any soil : but this is a great mistake. *Gorging* land with dung, for any product, is expensively ruinous. There is no surer mode of first deteriorating, and finally destroying, any plant out of its natural soil, than that of lavishly dunging it. And this misapplied extravagance, is injurious to plants either of rich or poor soils. The latter are, however, the soonest killed by high dunging.

Yet, take it for all in all, changing crops, or what is called convertible husbandry, in which grass, for a reasonable period, is only part of the rotation, will be found the most suitable to the circumstances of our country : save in such grounds in which the plough cannot be fitly introduced ; and are from their nature and situation peculiarly calculated for grass. For many such soils, those particularly which are boggy and wet, it would be unpardonable not to mention the *Agrostis stolonifera*, or *Fiorin* grass ; by means whereof wonderful improvements might be introduced, in soils fit for no other crop. Its reputation is now so completely established in Great Britain and Ireland, that objections to its culture have been entirely overcome. Failures, in England, have occurred, from want of care in cultivating the true species ; and thus bringing its character into disrepute. The *agrostis vulgaris*, has been used, instead of the *stolonifera* ; than which

there cannot be a greater mistake. Those who make experiments among us, should be very careful to obtain the true kind of this plant. It is a wise plan to cultivate and bring to the most perfect state, the plants congenial to your soil; and to avoid forcing, by artificial and expensive operations, the growth of those which only serve a turn and do not permanently abide; or are subject to disease and casualties, which appropriate plants escape. Although Fiorin will grow in most soils, it can only be profitably employed, in moist, or boggy, grounds.

Be careful to eradicate all *poisonous plants*, in your pastures and fields. You will find in books, what you want in experience, proofs of the necessity of this precaution; and you will learn the dangers to which cattle are liable in this regard. Some plants are poisonous to some beasts; though safe and salutary to others. A reasonable knowledge of the useful parts of BOTANY, without burthening yourself with its endless nomenclature; would enable you to distinguish plants and their properties. A *pocket magnifying Glass* should always be at hand; as not only highly useful in distinguishing plants and the enemies infesting them; but by it you could examine the particles composing earths; and ascertain their qualities and uses. This would afford entertainment, whilst it promoted your interests. Nothing is more necessary in the inspection of seed, whether of grain or grasses: you can discover, by your glass, unsoundness or malady in the one; and mixtures of worthless and injurious seeds in the other. No person should trust the naked eye, when purchasing grass seeds particularly; wherein poisonous or pestiferous seeds are frequently mixed; and many are so minute, as to be invisible to unassisted sight.

X. Explore your own, and the neighbouring Farms, for clay, marle, peat, earths, &c. for common benefit, and emulative experiment. Mixing soils of different qualities, improves more lastingly than dung. Some acquaintance with MINERALOGY, would induce you to provide the necessary and simple apparatus required in analyzing soils; and that described and recommended by Lord Dundonald in his "*Con-*

nexion between Chymistry and Agriculture," would be amply sufficient. See 1st. vol. Philadelphia Agricultural Memoirs, Selections, p. 57. You may also consult Sir H. Davy's Agricultural Chymistry, on this subject.

A moderate share of mineralogical and chymical knowledge, without extending it to the length required in a *Scavan*; will enable you to distinguish the qualities and properties of *earths*; so as to discover in your experiments, whether any substance be or not durably nutritious to plants; or a mere stimulant, (useful in its place and due proportion,) urging on the operation of other materials; without adding, of itself, any thing to the stock required for permanent fertility. It is said, by some, that the *Jersey pyritous earth, called Marl*, is of this description; and by others, that it is permanently fertilizing. Nothing decisive can yet be pronounced, as its many varieties differ in their respective effects. There are facts both ways; so that this earth when applied, and the soil it is intended to assist, should be carefully scrutinized; and the qualities of both practically known. Some English chymists, to whom it has been sent, style it an *Hydrat of Iron*; whilst others designate its composition, as a collection of decomposed *granite, schorl, silex, alumine, Iron*; in some specimens, (no doubt, those mixed with shells,) *lime*, and *magnesia*, with *sulphur*. A more accurate knowledge of its parts and properties, is still required: and it is to be wished, that our own chymists will give us their assistance. *Broom grass*, and other pests on worn lands, may be destroyed by a top-dressing of this earth and chloritic sands of a similar, though not so potent a nature; which substitute a natural growth of white clover. They may be ploughed in, for permanent melioration, after laying for some time. These substances may be found in many parts of our sea-board country.

Render WATER subservient to all its purposes. Dams and ponds, for collecting streams and their deposits, are magazines for manure; as well as heads for irrigation of grass, or even tillage crops; and watering is found, in countries wherein it is practised, equally beneficial to both. When springs or streams are absent, dams, to retain the deposits of rain-

floods, are highly advantageous ; by furnishing temporary irrigation ; and, finally, supplies for the compost heap. The *Chinese* have, time out of mind, set examples of constant use of irrigation ; and their modes of raising water from rivers, streams, &c. and of applying it, are to be found in many writers.

Acquire some knowledge of PRACTICAL SURVEYING ; and procure a small Compass, or a plane-table, or cross at least, with a chain and level. You will thereby be enabled to lay out your water courses, drains, and ditches, to the greatest advantage. You could, also, lay out your fields regularly ; and you should note their contents, and designate them by names, or descriptions. Too large enclosures are not beneficial ; smaller fields afford more changes for cattle or tillage ; and are more neatly, and less wastefully, fed or farmed. Some acquaintance with *Hydrostatics* and the *Mechanic powers*, would aid you in many branches of your business.

Visit, often, every part of your farm ; and fix, beforehand, your work. View, frequently, not only your water courses, but all your enclosures, crops, and woodlands ; and note what is amiss. You will thus guard against evils consequent on negligence.

Shew yourself in your fields ; in busy seasons especially. Your presence will animate the industrious, and stimulate the unfaithful and indolent. More profit will arise, if your concerns are extensive, from such attentions, than from all you could accomplish by your personal labour confined to one object ; to which, however, if your circumstances compel you to submit ; you will soon discover the superiority, (according to the country phraseology,) of “ come boys,” to “ go boys.” The one ensures your work ;—the other leaves it half done. If you are rich enough to employ an *Overseer*, you will be fortunate, if *he* will not require *overlooking*.

Although some of the acquirements and duties herein recommended, may not be necessary to a mere practical farmer ; they are not the less worthy of the attention of one who wishes, and has it in his power, to gain a more perfect knowledge of his profession.

XI. Be not discouraged by *casual failures*, from repetitions of good practices. Some seasons are more inauspicious than others, to some particular plants, or modes of culture. Confide in a general rule, although, in some instances, there may be successful exceptions. Avoid controversies about theories. An useful result is often neutralized, or lost, in a dispute on the cause or mode of producing it. A careful attention to *facts*, is far more instructive than the most elaborate discussions on theories.

XII. Gather all your SUMMER DUNG ; dropped near fences and hedge rows, (if you will suffer such incumbrances,) and under trees ; and mix it with earth, on a ploughed head-land ; to save it from sun, winds, and dung-beetles. All dung should be covered either with earth or a roof ; to prevent evaporation and waste of its most valuable ingredients. Mix no *hot* lime with your muck, dung, or compost-heap, before fermentation has ceased, or sufficiently advanced ; as it injures moderate fermentation, and often consumes the muck. Instances of even conflagration of strawy muck by hot lime, to a great extent, can be given. No doubt, excess of fermentation is injurious ; and over-rotted dung is not desirable. But extreme cases should not be resorted to, for instruction or argument. If lime be used, that slacked is always safest and best, when mixed with either dung or compost. A justly celebrated Lecturer, (Sir H. Davy,) objects to *watering* dung. But it can be proved, by many facts, that infinitely more losses and injuries to dung in stercoraries, have accrued from the *dry rot*, for defect of moisture ; than can be produced in watering muck or dung, from any cause. In covered stercoraries, as all ought to be, watering judiciously is all essential. See, among other proofs, Mr. Quincy's account of his stercorary : 3d vol. Philadelphia Agricultural Memoirs, pages 292, 3, 4, 5.

XIII. Sow no winter grain, the first year of liming fields. The crop is generally retarded in ripening ; and caught by mildew, blight, or rust. The liming here meant, is one sufficient for durable improvement of the soil. Those who lay on lime in small quantities, which may do neither good nor

harm, often, (not always,) escape injuries ; though they gain no immediate advantages.

XIV. *Select the best seed of all your grain ; roll it in plaster, after wetting it ; if you will not steep it.* But a change of seed entirely, when the grain has been sown too long on the same farm, can be *at once* accomplished, by procuring a full supply from distant places ; and the more distant the better, without waiting for the tedious process of gradual selection ; however commendable the latter may be. All thoroughly experienced writers recommend changes. Some distinguish between native and exotic plants. Our cultivated grains, particularly *wheat*, are exotic and should be frequently changed ; though some instances of long continuance of the like crops from unchanged seed, may be produced. Where wheat is native, it is a mean *grass* ; it being of the *Gramina* tribe. It has been improved to its now perfect state, by change of locality and culture, and by *crossing* ; which is effected by sowing different kinds together. Wheat so crossed has been proved to resist mildew and other maladies ; when common wheat of one kind, in the same or adjacent fields, has been ruined. Melioration of plants by crossing is found to be so successful ; that, in England, they are in the practice of applying a similar process to fruit trees. Mr. *Knight* has been very fortunate in renovating their Orchards, by crossing from seeds of different kinds of apples ; so as to produce, in a course of time, a new and vigorous race of apple trees ; the old kinds having been, for many years, in a state of irretrievable decay.

But the crossing must go no farther than the point of melioration ; i. e. unnecessary repetitions should be avoided. The barriers of nature must not be broken down. Hybridous mixtures are unfruitful and worthless.

Our grain plants do not tiller, or stool, as formerly ; and especially those necessarily sown late, to escape the *Hessian Fly*. A greater quantity of seed must therefore be allowed, than our predecessors were in the habit of using. One would imagine, that in countries celebrated for agricultural knowledge, the point of thick or thin sowing had been long set-

tled. Yet, in *England*, the *Farmer's Journal*, (a most valuable publication,) is filled with disputes on this subject; especially on the question, whether poor land should or should not be sown thickly; and rich land thinly?—Poor land should not be sown at all, with wheat, or any grain requiring much nutriment; if any adequate return be counted upon. It seems that spring wheat is sown thick; as far as three bushels to the acre; in the month of April, or beginning of May. A kind—the *triticum aestivum* of the Botanists, may be hoed, dibbled, or harrowed in, on bare places, where grain sown in the autumn has failed; and will ripen with the autumn sown grain. It is bearded, with white straw and reddish grain; and does not mildew. The *Talavera*, or Spanish wheat, is now in great credit in England. Possibly spring wheat would generally escape the fly. No successful means have been taken to gain a perfect knowledge of agricultural facts, in regard to this formidable foe; although we have so long suffered under its desolating ravages. *Oats* may sometimes attract the fly and save your wheat; as *Buck-wheat* sown or accidentally growing among corn-hills, invites the grub from your corn-plants.

The *drill husbandry*, and seeding with instruments for sowing in *drills*, calculated to save, as well as more regularly to distribute and nourish the seed, have had many vicissitudes of opinion and practice in Europe. Here, experience has been so much confined to a few, that it would be hazardous to pronounce, decisively, concerning it. It has zealous advocates; and should be an object of experiment, where circumstances warrant and require the practise.

Some contend for the efficacy of plaster sown on the winter grain; both for its beneficial operation on the growth of the plant, and to *repel the fly*. In the “*Inquiries on Plaster*,” republished in the 2d vol. of the *Memoirs*, a suggestion of its uses to repel the fly was made; and lately it has been alleged that it has been attended with success. But as to its use in increasing the growth or productiveness of the plant, great differences of opinion exist. When grass, (clover especially,) is sown on the grain, as is now the common practice, plaster

is apt to throw up the grass so luxuriantly, that it injures the growth of the wheat or rye, by keeping the lower joints of the stems so moist and tender, as to check the circulation of the sap; and cause them to lay or fall, when the heads are formed, and become heavier than the straw will support; though they are often mere chaff, through want of sustenance which is engrossed by the grass. Still this practice has respectable advocates. Clean and good farming, with a sufficiency of manure, admitting late sowing, so that the flights of the flies are, for the most part, over before the young wheat plants are in sufficient forwardness to afford a lodgment for the eggs or nits of the fly, seem to be the best guards against its ruinous ravages. Wheats with solid straw, resist the compression of the indurated tegument containing the nits, whilst pipy stems yield to its pressure; and when the head is formed, become prostrated by its weight. The yellow bearded wheat has been found to escape injuries from this inveterate destroyer. Some other kinds have been spoken of, as having similar properties.

XV. STEEPS are highly recommended, as guards against the maladies of grain; and for invigorating the first efforts of the plant. The *Flemish* steep of blue vitriol, or copperas, is said to destroy the parasitical plant adhering to the seed, and deemed the cause of *mildew* and *smut*. See Sir J. Sinclair's *Tour through Flanders*, 1815. But this, or any other, does not always succeed; and smutty grain washed in pure water, is often rendered fit for sowing, without danger of a smutty crop. There are so many, and so various opinions, on the causes of mildew and smut, that it is difficult to form a decisive conclusion. See, (among others,) 2d vol. *Philadelphia Memoirs*, 164, and in the 14th vol, of the *Bath Society Papers*, 54, &c. see article 3d, in which there is an ingenious and elaborate discussion on the diseases of *wheat*. Good farming, and well manured ground, so as to ripen the grain early, seem to be the best securities. *Spring wheat* most commonly escapes mildew and smut; and there are kinds quite as good as winter grain. Such should be sought for, and cultivated. In England, and other parts of Europe,

and in the northern parts of our country, summer wheat is raised to great advantage. Whether or not it would escape the fly is doubtful; for flies have been found in plenty in summer barley.

It is not yet agreed, what kinds of wheats best withstand injuries from the *Hessian Fly*. The yellow bearded and other wheats with solid straw, or strong stems, (the solid stemmed wheats being designated by the appellation of *cane* or *cone* wheats,) are deemed the most efficacious. Farmers should bend their sedulous attention to the selection of such wheats. Good farming, manure, and reasonably late sowing, are, certainly, the best securities. But *too late* seeding is unsafe: for the spring-brood of flies attack the tender plants of very late sown wheat, not sufficiently forward to be capable of resisting this foe, with the like destructive effect, we experience in spring barley; appearing to prefer, for this purpose, plants in the early stages of their growth. It is, most probably, a native here. It never entirely leaves us; though it appears, at irregular periods, in numbers less scourging than at times when its ravages are more conspicuously destructive. It seems to make movements of its main body from North and East, (where it was first perceived,) to South; leaving always, on its march, detachments or stragglers, sufficiently monitory to keep us on our guard. Its name does not prove its importation; for that appellation was bestowed during our revolutionary excitements; when every thing we disliked was termed *Hessian*. Entomologists class it among the *Tipulæ*; whereof there are more than 120 varieties. In *Hesse*, they have not this vermin, to annoy their crops.*

Steeping your seed wheat, is attended with little trouble or expense; and is, assuredly, worth the trial; as it has so many, and such respectable, advocates. Avoid, however,

*Since the above was in type, a scientific description of the *Hessian Fly*, and of a parasitic insect which feeds on it, has appeared. It is written by Mr. Thomas Say; and is published in the 3d number of the Journal of the Academy of Natural Sciences of *Philadelphia*. He has given the insect the name of *Cecidomyia Destructor*; and considers it specifically distinct from the *Tipula tritici* of Kirby, and entirely unknown in *Europe*.

steeps too strong ; as they sometimes prevent the seed shooting ; or produce a premature and sickly germination ; especially if the seed be not well rinsed or washed. You need be at no loss for a choice ; as so many receipts are to be found in books of agricultural authority, for steeps of various compositions.

The stunted or sedge wheat, may, possibly, be the consequence of seed grain being infected by disease, or infested by insects. It would be worth the experiment, to try the effects of steeps. Changing the seed, to a kind entirely different from that usually sown, has been found to be a guard against this serious and increasing evil. *Lime*, and strong lime water, often have beneficial effects on diseased seed wheat.

XVI. Be particularly careful in expending, as you should be provident in raising, every species of PROVENDER for your stock of horses, cattle, and sheep. A variety of food, and an orderly distribution of it, are more promotive of health and vigour in your domestic animals, than a lavish expenditure of any one species. Such as require previous preparation, should have it bestowed ; both for profit and economy. CUT or CHAFF your hay, straw, corn tops and blades, and even your stalks, with a powerful *Straw Cutter* ; and you will save a great proportion, which is otherwise wasted, or passed through the animal, without contributing to its nourishment. One bushel of chaffed hay at a mess, given in a trough, three times in twenty-four hours, is sufficient for an horse, ox, or cow. A bushel of chaffed hay, lightly pressed, weighs from 5 to 5½ pounds. An horse, or horned beast, thrives more on 15 lb. thus given, than on 24 or 25 lb. as commonly expended, (including waste,) in the usual mode of feeding in racks ; to which troughs, properly constructed, are far preferable. This practice has been now fairly tested by experience ; and the result accurately proved. This, and other great improvements in feeding their domestic animals, have been forced on the people of Europe by necessity. *Steaming Potatoes* has been long practised. *Boiling or scalding* provender commonly given dry, is found to be highly beneficial. The *Turnip culture*, on an extensive scale, succeeds better there, than it does

among us. The *Scarcity root* is there cultivated extensively, for dairy cows and ewes in milk; also for fattening cattle, with oil cake, occasionally, as a change. It supplies succulent food, in the season when such food is the most scarce. This root thrives well in our country; and should be more generally attended to; for swine and cattle particularly. For the latter, it is important at all seasons; its leaves in summer being as valuable, as its roots in winter or spring. Carrots may also be profitably cultivated. They are not only highly nutritious, but preventives against some diseases, and remedies for others, (asthmatic maladies particularly,) in horses or cattle. High prices, and scarcity of bread stuffs, will compel us to imitate European examples, in substituting esculent roots for grain, in feeding our live stock. Of *Potatoes* we know so much, both as to their culture and uses, that it seems unnecessary to mention what is commonly practised. It has been the opinion of many, for a long time past, that they are exhausting; and that unless additional manure is bestowed on the land on which *wheat* is to follow them, the wheat crop will not be abundant. This opinion is not confined to our country. Many believe potatoes are best in dry soils; yet it is asserted by an intelligent writer, in England, (see Bath Papers, vol. 14, page 147,) after actual experiment for 16 years, that "potatoes will never be mealy, if not grown in tolerably moist ground;" and a drained boggy earth is preferred to all others. In this kind of earth, the *Irish* potatoes are generally cultivated. It is fortunate, that this root will grow in almost any kind of soil; and the advocates for different opinions may respectively indulge in taking their own course. Potatoes are generally planted too late. Early planting admits of the crop being gathered in time for sowing wheat, by those approving that practice. Contrary to common opinion, it is now said by some practical agriculturists, that young, or unripe seed potatoes, are most productive.

Teach yourself, by reading and observation, at least the outlines of VETERINARY KNOWLEDGE; and promote its encouragement. This will instruct you in the best and most wholesome modes of feeding, as well as administering inno-

cent preventives and remedies. Do not depend on charlatans, or servants, for what a little attention on your part might avoid or remedy. Never neglect frequent visits to your farm yard and stables. Good servants are encouraged, and bad ones detected, by such attentions to your own affairs.

Keeping accurate and lawful WEIGHTS AND MEASURES, is not only demanded by integrity in dealing; but it teaches a habit of looking into the minute details of your affairs, highly conducive to profit and economy. When this habit is fixed, you will do nothing at random; but symmetry and calculation will appear in all your concerns; and success will generally crown endeavours planned agreeably to well ascertained data, and not undertaken with thoughtless conjecture and hazardous guess work. Feeding your stock by weight and measure of food, will not only save your provender, by its orderly distribution, but, frequently, the lives of animals; too often starved by niggardliness or neglect, or gorged and destroyed by profusion. If it be true, as it is, that "the master's eye makes the horse fat;" it is equally so, that the master's eye prevents the horse from being pampered, wanton, pursive, bloated, foundered, and, finally, wind-broken and blind.

When any of your live stock die of disease, or invisible casualty, have them opened; for discovery of the cause, and future instruction.

XVII. Feeding, in stalls, or Pens, on green forage, which is called SOILING, has not been sufficiently practised here, for us to form decisive opinions of its practicability and preference, under our circumstances. It has been favourably represented by some who have tried it; and it merits farther experiment. If proper preparation be made, so that a certain succession of green food could be ensured; the practice, in many situations where labour is at command, and droughts do not interrupt the supplies, appears highly commendable, on the score of saving our summer food, by expending it at *our* pleasure, in place of suffering cattle, at *their* will, carelessly to browse over and waste much pasture. It saves the expense of inclosures; which, in our mode of dividing farms,

essential in our present arrangements, are very costly ; and adds to our stores of manure, which can be applied in a less advanced state of fermentation ; the seeds of weeds and coarse grasses having been prevented from ripening and increasing, by the frequent application of the scythe. In England, and other parts of Europe, they grow the *Chicory*, very profitably, for soiling ; and make much use of the spring and winter *Vetch*. No extensive experiments have been made here, in the culture of these plants ; and it would be desirable, that some spirited agriculturist would give them a fair trial. Instruction in their cultivation, can be readily obtained, by consulting British and other publications on the subject.

If cattle or sheep are penned, the pens should be frequently moved ; and the dung of cattle composted. They should not be placed in declining situations ; from whence the dung and urine are wastefully washed away. Moveable pens for sheep, have great advantages. They are safe (in proper pens) from dogs ; and their dung fertilizes beyond any other. If for health and convenience they *must* range in the day, penning at nights, unless flocked (and well guarded) on an extensive scale, is essentially necessary. Multiply your pens, rather than crowd too many in one fold. Be not sparing of a reasonable allowance of *salt*, to your domestic animals of every description. Some prefer rock salt for sheep, to lick at their pleasure.

XVIII. The effects of FIRE on soils, are well known in foreign countries to be salutary ; and here, proofs are not deficient. Various modes in which it has been applied, are to be found in European books. When carried to excess, it is, like all good things abused, no doubt, injurious. Nor would any one wish to destroy the inestimable vegetable matter of a sod, capable of being completely decayed, so as not to vegetate ; for this would be unnecessarily wasting the means of restoring fertility, by the co-operation (with this inert vegetable matter) of manures, or materials for the food of plants in the earth or in the atmosphere. But where bulbs, or other pests are otherwise indestructible ; or the substratum be clay, proper for burning into highly fertilizing manure ; there can

be no reasonable objection to the application of fire. *Denshiring*, or *burnbaking*, is described in agricultural books; wherein its benefits are developed, and the improper use of it pointed out. *Burnt clay* has been long known to be fertilizing; and so are the ashes of *peat* and *turf*. Even burning brush and straw on fields, is proved to be almost incredibly fertilizing and productive. Burning the foul cover of wild grass and weeds, before ploughing for Indian corn, even in the spring, has, in frequent instances, destroyed the grub or the eggs of its parent. In *what manner* heat operates on soils, is not essential; nor is the inquiry whether the effect be produced by the ashes, or the mere application of fire. The facts are well ascertained; and *that* is enough for all practical purposes. Some soils may be less benefitted than others; and with some, burning may entirely disagree. Whatever may be the theory of, or prejudices against, this operation, it behoves us at least to try, if even on a small scale, a practice which has the approbation of eminent and successful practical and scientific agriculturists in Europe. And in this, as in every other operation, a farmer should know and calculate on the nature of his own soil; and thereby judge of the expediency and propriety of any practice.

XIX. Our awkward mode of DITCHING and DRAINING our swamps or wet grounds, is not only inconvenient and unsightly, but occupies space unnecessarily. UNDERDRAINING, and thereby preserving a level, dry, cultivable and productive surface, is every way eligible; where the site will admit of it. It would be well for some spirited agriculturist, to set an example of improvement in this regard. Lessons, in European books, for underdraining, are in plenty; and there is one in the Memoirs of the Philadelphia Society.

In declining grounds, a straight open ditch in the direction of the declination, is injurious and dangerous. Violent floods, in such ditches, always produce a ravine or gully. The ditch should be oblique; and calculated to resist them, whilst it still affords a sufficient passage to floods. Nature establishes precedents; *her* streams being generally meandering and flexuous. *Under, i. e. covered, drains*, are not liable

to the ravages of floods; and may be straight, without being exposed to the dangers to which open ditches are subject. Our rich alluvial tide-water meadows, are not included in these remarks; the drains and ditches of these, for the most part, must necessarily be wide and open. Modes of *surface draining*, and instruments for the purpose, are pointed out and described in European books; and are well worthy our attention.

The fertile bottoms on rivers and less streams, frequently prove the fecundating effects of overflows occurring from floods; which leave their rich deposits on the recession of the waters. In Europe, they practise what is there called *WARPING*; to produce, artificially, the like result. By means of banks, dams, and flood-gates, where there is fall enough to drain off the tides admitted, they introduce the water of a river, (and the more turbid the better,) and suffer it to remain stagnant until it has not only destroyed worthless vegetation, but by the settling of the rich mould which has been held in solution, a great store of manure is deposited, for profitable culture and renovating the fertility of the soil. After their first operations are completed, they suffer the banks, sluices, and flood-gates to remain; and admit the water, occasionally, as it may be necessary for either irrigation or manure. In our embanked meadows, something of the kind is accidentally or purposely done. But it would be well, where it is practicable, to introduce this improvement among us. Many modes of irrigation are practised in other quarters of our globe; but *here* water is not applied to agricultural purposes, in any degree equal to the uses whereof it is capable. In our southern countries, it is only applied to particular crops. *Birkbeck's* account of irrigation, in the south of France, is well worthy of attention. It will be seen, that its uses are not confined to grass; but are extended to every species of crop, and so had been, there, through ages: Channels for the conveyance, distribution, and delivery of water from one farm to another, have remained for a time beyond the memory of man; and are held as inviolable as the boundaries of property. But the use of water should be carefully

studied. Stagnant water, if suffered to remain long, injures vegetation; and even its deposits of rich manure have bad effects on some grain, in the first instance, though finally they fertilize wonderfully. *Wheat* is the most injured by stagnant water; and is often so scalded and deteriorated, as to become abortive; and produce only *cheat*. In winter, the irrigation of grass grounds, is held to be most advantageous; and the water is more nutritive by its deposits. In hot weather, it scalds, and should be turned off, so as to be only occasionally used.

XX. Always rather *understock* your farm, with domestic animals. An extra number of *Horses*, is the most oppressive. No farmer should be without a due proportion of *working oxen*. The *neck yoke* is the simplest, but is not deemed the best mode of enabling them to work. That *fitted on the forehead* and attached to their horns, or *collars* and other appropriate *gears*, are, by many, preferred.

Have no more *Swine* than you can feed well; (always rung,) and kept within your own inclosures, if your farm be in a populous neighbourhood. Running hogs are fertile sources of bitter enmities, and petty controversies. A rooting hog wastes its flesh; and requires more food to restore it, than is gained by the scanty prey after which it labours. Nothing is better for store-swine, than red clover eaten off the growing plant. But, differently from horned cattle, green clover cut and given to them, will not keep them in good plight. They waste as much as they eat, and do not relish it in this way.

In a well managed *butter dairy*, skimmed and butter-milk will afford means of raising a store-pig to each cow; beside a due allowance for some sows, to produce pigs for store-hogs; and roasters for the market. Few farmers, however, do so much; because they will not raise esculent roots, as substitutes for grain, for winter keep of store-hogs. A milk dairy furnishes food for sows and pigs, from the offal and unsaleable milk.

Let all your stock of animals be of the best breeds: but study useful qualities, more than shewy figures. Yet well

proportioned and sightly animals are generally the most valuable, both as it regards usefulness and keep. There are exceptions ; in dairy cows particularly. *Large* horses, cattle, sheep, and swine, are not the most profitable. Those of the middle sizes are, on every account, to be preferred. Ostentation, (and, as it respects the *horse* particularly, a less innocent motive,) more than real benefit, too often excites those who value themselves on exhibiting very beautiful horses, very large and very fat, (and of course very expensive,) cattle, sheep, and swine. This may be, and is, a laudable pride in those whose circumstances admit of indulging it ; and breeding well formed and well endowed animals, is highly worthy of encouragement and merited praise. But hardihood, and easiness of keep, should be prominent qualities ; especially in the stock of a farmer. For such qualities, and many other good properties, the *Tunis sheep* will be found worthy of great attention.

Our breeds of horned cattle particularly, are too little attended to ; and dairy cows, especially, are with difficulty obtained. True, the demand for them is much increased. But this should operate as a stimulant to multiplying their numbers and attention to their breed ; which requires different qualities, in many respects, from those fit for the knife. For this reason, a variety, in breeding cattle for the specific purposes to which they are devoted, should be carefully studied. *Mules* are highly valuable ; but are not so generally used as they should be. It would be well to spread this long lived, hardy, and laborious animal, of the best kinds, through our country. Breeding *in and in*, i. e. from the same family, is a subject of diversity of opinion. No doubt a *selection* from a *large* flock or *herd*, of the finest forms and qualities, however near the blood, will generally ensure a good race. But when the parent-stock is small in number, and kept too long on the same farm, the experience of many respectable breeders is decisively favourable to changes and crossing : exceptions there are to this position ; and so there are to every general observation and practice. It is generally agreed, that the male stamps the character of blood and breed on the progeny.

Against keeping an unreasonable number of *sheep*, there have been, recently, ample warnings. Such excesses, generally, (but, for the time, injuriously for individuals,) regulate themselves. In *England*, extravagant speculations in *sheep*, were checked; (as far as legislative interference could accomplish,) by *laws*. In the time of *Henry VIII.* an act of Parliament recites, that some flock-holders had 24,000 *sheep*; and it enacts, that no person shall hold more than 2000! Religious communities and characters held the largest flocks, and thus depopulated the country, and forced the labouring classes into mendicity and crimes, for want of employment. They drew on themselves their dissolution, and restraints on their sordid propensities; by thus affording to this arbitrary monarch, some plausible pretexts and many justifiable motives, for his fatal hostility towards them. See an interesting Paper on the *Poor, and Poor-Laws; Bath Papers*, 14th vol. pages 245, et seq.

Such causes have, in no small degree, contributed to keep the plough idle in *Spain*, and other countries where, according to the quaint phraseology of an old poet, “sheepe have eaten men, many a yere;” in place of “men eating sheepe.” Instances, however, of excessive abuse, are no arguments against breeding these highly valuable animals, in numbers adequate to our prudent demands for them.

Great flocks may be kept, in parts of our country in which they would not interfere with other branches of husbandry. *Locality* is, therefore, of primary importance. Lines of states are well for jurisdictional purposes. But local prejudices are injurious, on the great national scale. Mutual wants, plentifully supplied, will bind us in bands of common interests; and we shall the sooner become *one people*. If, in old districts, cattle or sheep cannot be so advantageously raised or fatted as in newly settled countries; let us apply our efforts where they are most beneficial. What liberal mind was not gratified by a recent influx of prime beef-cattle, from the western country; some of them preferred, by our victuallers, to those of our vicinity, after having been driven more than 400 miles? The seaboard markets will thus be reduced to

their proper level; for home consumption and external commerce.

A farmer should confine his objects, to such as properly fall within his system of economy; so that one member of his general plan shall not interfere with, but be assistant to another. There are sheep for farmers, and sheep for flock-masters. Speculation should not be indulged; being adverse to habits of industry; and tending to bring on reverses, which an husbandman is ill calculated to bear. Extravagant speculations, in any pursuit, defeat their own objects, by lessening the value of an article increased beyond the demand; and, in such case, a kind of reaction reduces its price below its real estimation. A farmer should sedulously avoid propensities which foster ideas, that profits are to be gained by *lucky hits* in the lottery of chances; in preference to the slow but sure rewards of industry, economy, and prudent management.

XXI. FAMILIARIZE YOUR YOUNG DOGS with *sheep*, and correct them, when they chase or annoy them; and they will protect, in place of injuring your flocks. Dogs become sheep-killers, by neglect in training them. Starved curs prowl for prey, and become savagely mischievous. Those who do not pen their sheep, and bring them home at nights for protection, but leave them in distant fields, expose victims to such dogs; and they ruin even innocently inclined dogs, by throwing temptations in their way. They have no right, therefore, to complain of injuries. Good and faithful dogs are as necessary on farms, as sheep.

Accustoming dogs to feed on raw and bloody food, renders them inclined to seek it. The sight or smell of blood, infuriates many animals. Horned cattle are peculiarly affected by it. Not only dogs, but horses, operated on by the sight or smell of blood, have been known to be seized with fits of sudden rage; and instances can be related, in which they have dangerously attacked persons whose garments had been stained with, or smelt of blood, although commonly familiar with them. Animals, (man included,) become habitually and culpably fond, of what, at first, may have even excited an-

tipathy and disgust. Sheep-killing begins in wantonness, and ends in vice; and is a species of canine madness. The confirmed blood-sucking sheep-killer, acquires a wild shrill bark, different from that of other dogs.

Shameful negligence in not burying dead carcasses, not only reflects disgrace on those who permit such nuisances, on other accounts; but the dogs of a whole neighbourhood are often ruined, by such temptations to savage propensities.

XXII. Do not commence with erecting **COSTLY BUILDINGS**; but apply your time, efforts, and pecuniary means, to your farm; and shift on with tolerable accommodations, until your fields warrant your providing better. Want of calculation in this regard, when their funds have been limited, has injured and depressed many beginners in farming; who have erected expensive houses, which have exhausted their means of improving their farms; and capacious barns, with little to store in them. If difficulties in their affairs compel them to sell, they find, that, however expensive may have been the buildings and accommodations, a poor farm must be parted with at a very inferior price; and the buildings are seldom duly appreciated, in a calculation generally made on the value *per acre*. When the farm becomes productive, it seldom, if ever, happens, that the barn is too large. The most general mistake is, that it is too small; and most commonly, the floor is too narrow for treading out crops with horses, or using our simple machines for threshing; which, (though not so powerful,) are tolerable substitutes for the complicated and expensive, however valuable, inventions, with which, in some parts of Europe, grain is threshed out. In the moist countries of Europe wherein there are late harvests, stacking is preferred to confining grain in barns, which is said to be injurious on account of retaining dampness, and promoting mouldiness in both grain and straw. But in our climate, favouring early harvests, with generally fine weather, no such consequences follow; and barns are all essential. In the southern parts of our country, they are dispensed with too negligently and unprofitably. The great farmers tread out their grain from the harvest field, or from stacks, as

promptly as possible. By this means, the grain is at market before the moth fly is grown sufficiently to injure the flour ; and thus they have almost conquered that pest. And this, in some degree, justifies their lack of farm buildings. Save that in covers for their farm stock, they are lamentably deficient.

Let your *dwelling house* and its appendages, be to leeward, (as it respects commonly prevailing winds, those in winter especially, when fires are constant,) of your barn and stack-yard ; and sufficiently distant from them to avoid accidents by fire. Lights should be, as much as possible, forbidden in your barn and stables ; and suffer not the reproach of omitting the common guards to your buildings, against lightning. Their being placed near water conveniences, may answer some purposes ; but this should generally be avoided, especially if streams be large and dull, or collected in stagnant pools. Low and damp sites for dwelling houses, generally produce fatal consequences to their occupants. Leading distant springs or streams to your homestead, or digging wells, may be costly and inconvenient ; but health and comfort are thereby ensured. When buildings and other improvements are placed too near *mill-dams*, or *rivers*, and *streams subject to floods* ; repentance comes too late, after ruinous consequences have been suffered by such want of foresight and calculation.

Stables for horses should not be too close. Diseases are generated by confined air ; and horses kept too warm cannot safely encounter cold and wet. Fattening cattle and sheep, in sheds open to the south, and suffered, in good weather, to run out in yards, are always hardy, healthy, and thriving. *Swine* kept in too warm, and more so in filthy pens, are ever subject to diseases and unprofitable feeding. There is no greater mistake, than that of *gorging* swine, when first penned for fattening. They should, on the contrary, be moderately and frequently fed ; so that they be kept full, but do not loathe or eject their food ; and, in the end, contract fevers and dangerous maladies, originating in a hot and corrupted mass of blood ; against some of which, *dry rotten wood*, as an absorbent, and, some allege, *smith's cinders*, thrown in their

pens are preventives. In airy and roomy, yet moderately warm pens, paved or boarded and often cleaned, they are healthy and thriving. They shew a disposition to be cleanly, however otherwise it is supposed; and they always drop their ejections in a part of the pen different from that in which they lie down. No animal will thrive, unless it be kept clean. When cleanliness becomes habitually practised, it is easy to preserve it. But if filth be suffered to accumulate, the removal is a *task*—irksome and procrastinated.

XXIII. Keep accounts of all your expenditures and receipts; and notes of remarkable occurrences on your farm. Recording even your errors will benefit yourself in future avoidance; and become warnings to others. Your successful practices will be examples. You owe it to yourself, your children and your country, to register and promulgate them.

XXIV. Read, and do not slight, either foreign or domestic books of reputation for principles and practice, on agricultural subjects. Climates may and do differ; but principles are invariably the same. If you have, as you ought, a desire to be well acquainted with your art, gain some knowledge of subjects elucidating its principles; and particularly of CHYMISTRY, as connected with agriculture; although you need not aim at being a perfect Chymist; nor qualify yourself as a disputant on theories and vain and unprofitable discussions, which produce no beneficial result; but, on the contrary, bewilder those to whom information of plain principles and facts, and practical lessons, are the most necessary.

Home's Principles of Vegetation, Darwin's Phytologia, Hunter's Georgical Essays, Anderson's Essays, Lord Dundaonalds Connexion of Agriculture with Chymistry, Davy's Agricultural Chymistry, are among the books, giving a general view of principles; and books of practice you can obtain at pleasure. The former you can use as lawyers read *Blackstone's Commentaries*; and the latter as *they* apply to reports, for detailed and practical information.

XXV. EXPERIMENTS are highly commendable, but do not set out as an habitual experimenter; as if husbandry were a new art, (however defective it may be,) and every thing de-

pended on your own discoveries. In such case, you would consume your labour, time, and means, which should be devoted to settled and known practice, in pursuing your own suggestions ; or in clearing up your doubts on the experience of others ; most probably unprofitably and unnecessarily. Listen to intelligent and successful practical men, whom you will easily distinguish among your neighbours. Do not imitate the exclusive self approbation of too many farmers ; who impatiently and heedlessly wait whilst information is offered ; until they can relate what *they* are doing, and have done. Yet where even a failure will be attended with no serious injury or expense, fear not to attempt an improvement or discovery ; although the endeavour may be unprecedented. It most assuredly requires experiment to adapt foreign practice to our climate and circumstances ; and to make essays to change or meliorate our defective usages. But we are not so far behind, as that most of the common operations are not well understood and reputably executed.

It is not intended to say any thing on the subject of *profits* of husbandry, as these depend so much on the circumstances both of the farmer and the farm ; accordingly as its culture is applied to grain or grass, or mixed husbandry, and the management and economy with which its business is conducted ; that no calculation can be made, on general principles, with any degree of correctness. Those, however, who do not personally labour, and have every thing to hire or purchase, should be moderate in their expectations ; and for them a grazing farm would be the most eligible. But a *farmer* on his own farm, as is the case with most of our husbandmen in this happy country ; wherein they are burthened with no tithes, heavy rents, and oppressive poor rates ; and pay, comparatively with other countries, light taxes ; helping themselves and assisted by their families ;—thus avoiding the payment of much wages to hirelings ; and, of course, not subjected to their caprices, vices, idleness, and defalcations ; contented with wholesome subsistence, in great plenty, and reasonable profits ; can live well and independently, with even a tolerably good system of husbandry ; and sit “every man

under his vine and under his fig tree, and none shall make them afraid."

Those who wish for enjoyments comparatively elegant and luxurious, must depend on other resources than those of a mere farmer on a moderately sized plough farm, producing chiefly grain; or even a grass farm of reasonable extent; but, with every additional resource, they will not be a jot the happier in real comforts; though their habits may require artificial substitutes for them.

A farmer can be a well informed *gentleman*, according to the true import of that appellation, without the imitative and shadowy pretensions of many who affect that character; which does not consist in expensive display. Let his motto be, *esse quam videri*;—to be, and not merely to seem;—and his station in society will be respected, as it merits, for useful actions; and he may be distinguished for politeness and suavity of manners, without the tinsel of affectation and insincerity. He will be more esteemed, the more he accommodates his wants and habits to his circumstances.

XXVI. A farm homestead is enlivened by **POULTRY**; and family comforts are much increased by their eggs and young. But their numbers should be kept within bounds; and their kinds prudently selected; as some are less inclined to wandering and mischief, than others. *Turkies* are the most mischievous and offensive; and *geese* are predatory trespassers; very voracious, and injurious to grass grounds. It is questionable, whether the balance of the account, giving credit for their market price, (and some believe it might be doubled) be not much against both. So that, in many situations, it would be, perhaps, most economical, if they *must* be had, to buy them for the table. *Dung-hill* fowls, of innocent breeds, are preferable to either. Confining these too much has not been found eligible; and high feeding is not promotive of, but checks, fecundity. It also destroys one of their uses, by making it less necessary and desirable to them to seek for and destroy insects and other pests to your garden and fields. They thrive better when kept in good condition; and by moderately feeding them at home, they return from wander-

ing, and preserve their domestic habits. They often injure the garden ; but some gardeners think that they do more good than harm, by devouring insects and noxious vermin. The absence of *wild birds*, whether owing to irregularities of seasons, or wanton destruction, is often seriously felt in the increase of insects on our farms. The depredations of *birds* are fully compensated by the services they render to us ; whilst, for their own support, they are preying on our enemies. Our *poultry* are entitled to regard on this account. They may be broken of bad habits, by checking intrusions ; and feeding them exclusively, in places distant from the garden. Those who find them ungovernable and too mischievous, may keep them in poultry yards, or banish them entirely. *Pigeons* are seriously mischievous ; and should either be kept in small numbers, or not at all. *Guinea fowls* lay abundance of eggs ; though in some cold countries it is otherwise. But they are inveterate enemies to other poultry. Fowls, however, laying the most eggs, which they can do without frequent congress with the males, are not remarkable for breeding ; many of their eggs being barren. Those laying fewer eggs, more frequently incline to incubation. *Turkies* among tobacco plants, are valued for their feeding on the worms which infest them. Mr. *Coke* of Norfolk, in England, purchased hundreds of *ducks*, for worming his turnips. Whatever may be their value, in these disgusting however useful instances of filthy feeding, it would require the absence of all our prejudices for us to relish them at our tables. Those who bought Mr. *Coke's* fat ducks, were happily ignorant of the means by which *the delicacy* was rendered merchantable ; and no objections are made to feasting on turkies thus fed, by those whom habit has reconciled to such repasts. Good eaters are, however, too busily employed on the subjects before them, to suffer the intrusion of over-nice associations of ideas.

Hen houses and nests should be kept clean ; nor should they be too close and warm. Filth generates vermin ; and heat is injurious, both as it respects health generally, and particularly at the times of incubation, when over-warmth in the

hen is prejudicial to hatching ; insomuch that she frequently turns, and often leaves, her eggs to cool. Be careful to guard against the access of egg-suckers. Minks, rats, and weazles, are greatly so ; and they and other such vermin are destroyers of poultry. Dogs are not much behind them in this propensity, and should be chastised and broke of the habit of egg-sucking, when young : they otherwise retain it through life.

The dung of poultry is well worth your care. It is so powerful, that it would fertilize, if even sown by hand-fulls ; and it must, therefore, be thinly scattered.

It must be seen, that many of these observations, as they relate to some kinds of poultry, apply to farms in a thickly populated neighbourhood where range is trespass. The kinds most noxious in confined situations, may be profitably and extensively raised in other districts of our country, wherein circumstances favour the breeding them. Too many cocks should not be kept. Their ferocity in combat, (the more frequently shewn, when extra numbers contend for the same object,) is not a proof of their fecundating properties ; and the gentlest and best formed should therefore be selected. One for every 8 or 10 hens will be sufficient. The others may be emasculated, and thus improved as an esculent, highly valued where the practice is common. CAPONS are rare among us ; but it is unaccountable why this addition to our fare has not been more attended to. *Hens* hatch only one brood, or two at most, in a season. A *capon* may be taught to hatch, and most carefully rear and hover, several broods in the same year.

Runtz and mean breeders, of either sex, should be killed. It is scarcely possible to prevent different breeds, in the same yard, from mixing. But if breeders are sizeable, it is by no means a subject of regret, that they communicate with each other. *Crossing* most commonly improves poultry ; as it does other animals as well as plants. But they must not be of a distinct species : for some kinds produce, by mixing, mules or hybrids which will not breed. The Muscovy with the common duck, affords a frequent instance of hybridous, and commonly barren, progeny.

A singular instance of the benefits derived from poultry, was presented to a number of respectable witnesses of the fact, some years ago, in a part of an unseated country in Pennsylvania; far removed from population. A solitary New England settler, was found clearing the woods and building a cabin for the reception of his family; who were to follow him with *the rest of his stock*. He had brought a number of *poultry*; and a flock were seen around him, which, by their eggs, furnished the chief part of his support; and with this sustenance, he declared he was perfectly enabled to labour. Occasionally he procured some grain from distant settlements, which the fowls sparingly shared with him. This, and the precarious supplies of the forest, kept them and him in good plight. They never wandered, but always associated with him; as well for protection as from habitual attachment.

XXVII. Few farmers attend, sufficiently, to the necessity of providing the best, (and the best are generally those the least complex in their construction,) as well as the most appropriate INSTRUMENTS OF HUSBANDRY; and the implements, utensils, and tools of *their trade*. All occupations require those who follow them, to be closely attentive to the means of carrying them on with facility of execution and consequent profit, by tools appropriate to every operation in their business. But a plough or two, some common harrows, a cart or waggon, with some ordinary tools used in common and minor operations, too generally fill the catalogue of farming instruments and implements. *Ploughs* should be various, and calculated for different uses. Among them is a plough introduced in the hilly country of Virginia by Col. *Randolph*, for ploughing, *horizontally*, mountainous or hilly lands. An account of it will be seen in the 4th vol. of the Philadelphia Memoirs, in a letter from Mr. *Jefferson*. The like practice is followed by the Germans inhabiting mountainous countries; but their ploughs with shifting mould-boards are differently constructed from that mentioned. Every farmer should accommodate his instruments to the local situation and attributes of his farm; as well as to the uses common to all

situations. *Harrow*s should be constructed for the variety of purposes required in good husbandry. *Coulter* and *hoe harrows*, as well as others adapted to different operations, should be possessed by every good farmer: and among the less instruments, the *horse rake* should be better known and more generally used. This saves much manual labour in gathering *hay*; and is peculiarly fitted for raking *grain-fields*, (the borders whereof, after being reaped, should be cut with the scythe, or cleared otherwise of weeds,) so that quadruply the expense and labour of the operation is gained by the saving of grain which would otherwise perish. See 3d vol. Philadelphia Memoirs, 212, 13. There are *hand-rakes* for this purpose, wherewith one labourer will do as much work as two or three with the common rake. The *roller*, both plain and spiky, is as essential as any other instrument; yet is not so common as it ought to be. *Riddles* and *screens* for cleaning our grains, are highly improved of late years; yet few farmers possess the best. The *potato riddles* are great facilities, to save time and manual labour, in sizing and separating those roots whilst gathering; yet few possess them at all, and others have them badly constructed. Improved *cutting machines* will be found all essential, when the practice of chaffing hay and other provender becomes duly appreciated. No pains or reasonable expense should be spared, in substituting some effective *threshing machines* for manual labour; and thereby overcoming one of the greatest embarrassments in our rural affairs.

XXVIII. Encourage the establishment of an AGRICULTURAL SOCIETY, in your neighbourhood; and contribute your share of useful information. Let it be furnished with a well selected, however small, library; on subjects as well practically as theoretically connected with husbandry. Avoid turning it into a club for mere amusement, or topics of controversy and dissension: but let the objects of its meetings be confined to the improvement of its members, in the business to which their lives are devoted. One of the great objects of such societies should be to enlighten the minds of our citizens, on the subject of *roads, canals*, and improving the navigation of rivers, bridges, and other facilities for transport. All the

partial inconveniences, of running through farms, payment of tolls and other minor objections, are no more than the dust of the balance, when weighed against their incalculable benefits to agriculture, arts, and manufactures.

XXIX. However unpromising may appear the task, use your endeavours to incite, and with address, mildly and moderately to invite such of your neighbours who require and will listen to a benevolent *Mentor*, to habits of industry, economy, and sobriety : for such habits are the only requisites in this country, free from the impediments and disadvantages existing in many others, to enable every well disposed citizen to advance his interests and comfort. They are impenetrable shields against poverty and want. Point out to them the advantages of depositing a small portion of their earnings, in *saving banks*, or *well regulated friendly and benefit societies* ; as sure resources against penury, and relief in sickness and incapacity to labour. as well as for the education of their children ; to guard *them* against the miseries of unlettered ignorance and its companion vice. And for this purpose, encourage and patronize the *Lancasterian* plan of teaching. It is the most practicable and effectual, as well as economical improvement in the means of education of young members of the community, unable in any other way to acquire learning, and to whose wants it is peculiarly adapted, that has ever been introduced among any people : and especially among *our* citizens, enjoying universal suffrage in our republican system of government. Knowledge and information, to qualify them to inquire and judge for themselves and not depend on assistance often seductively rendered, are essential to their freedom and happiness. This knowledge and information can only be acquired, through the facilities afforded by education ; and what is called a common one, which must be gained in early life, is fully competent to all useful purposes for which *they* require it.

Religion and morality, to which all earthly considerations are of very inferior importance, will spread their benign influences over minds enlightened by the information such

means of attaining it will furnish. No people can be happy, and no government, (especially one founded on republican principles,) can be safe, when religion and morality, (twin sisters,) are not the predominant habits of the mass of its population.

Associations should be formed, to moderate, if it cannot be totally abolished, the custom of dealing out to labourers, *ardent spirits*;—the most dangerous and destructive foes to the peace of a community; and to the prosperity and happiness of individuals afflicted by a propensity to use them incontinently. Those who furnish the means of destruction, are equally culpable with those who perish under their enticements.

If, out of county funds or by private societies, some premium or medal were given to poor parents, to encourage binding their children, often kept at home in idleness and want, to regular trades, or employments in husbandry, much benefit would arise both to the parents and children. Hiring them to occasional labour, or in manufacturing establishments, conduces nothing to their permanent benefit; either as it regards education, morality, or final settlement in life. There is an unfortunate reluctance on this subject, which might be overcome by honourable notices and distinctions.

Savings placed in the way of accumulation, in the mode recommended, would enable persons in narrow circumstances, in a course of time, to establish themselves at home; or, if they are so disposed, in our new countries, when their families increase in numbers and strength. Plans of such banks and societies and of the schools mentioned, can be readily obtained. Dealers in ruinous temptations to waste time, health, and morality, will not have so many customers, when money, too often devoted to baneful dissipation, is saved for meritorious and salutary purposes; but our country will incalculably benefit by the increased numbers and vigour of its population. Youth and manhood would enjoy innocence and health; and penury would be averted from old age. The less idleness and drink, the more bread. This remark would be

unnecessary, could those to whom it is applicable and monitory, be induced to follow the instruction, and feel the excitement, conveyed by the old but evergreen Apothegm,—

“*Industry is the right hand of fortune ; and frugality her left.*”

XXX. If many of these *mementos* should be deemed trite and unnecessary, by men of agricultural intelligence ; they will, nevertheless, be found useful to beginners. The listlessness of old farmers, often requires something like Dean *Swift's* Flappers. What is considered as trivial, obvious, and minute, requiring little exercise of mind or faculty, is overlooked and walked over every day without observation : yet such details and items are as essential to the great concerns of life, as are the letters of the alphabet, and the common grammar rules, to literature. The Germans have a homely, but expressive axiom,—“*List ist besser als mist ;*”—skilful management is better than dung.—It has been the aim of the foregoing Notices, to unite the benefits of both. With skilful management, steril and worn lands may be made durably productive. Without it, the fertility of the richest soils is soon dissipated. Novelty or originality have not been the objects of this defective compendium. Facts and opinions are drawn together presumed to be warranted by experience, or collected from writers of reputation. Nor are any practices or opinions recommended as exclusively preferable ; however pointedly they may be mentioned. They are intended as mere suggestions and hints to beginners ; and not promulgated with any view to assume superiority of knowledge or judgment, over those who may consider other practices, or opinions, more correct.

It is a melancholy reflection, that the principles and practice of an art, on which the subsistence and comforts of the human race so materially depend ; should still be subject to varieties in opinion and contrarieties in practice. Few of even the rude outlines of a subject so copious, can be comprised in a compass so narrow. Nor can it be expected that any more could be noticed, on many points, than the practices respectively mentioned ; leaving the details of execution

to be sought for in experience, from practical monitors, or books.

The ART remains imperfect, although so many ages have elapsed since man was first doomed to cultivate the earth; and countless volumes have been written on the modes of fulfilling his destiny. Some benefit is, however, always derived from the most humble attempt at instruction; if it be received with candour and discriminating judgment. It would be as hazardous and vain, (though leading and settled principles are generally applicable,) to recommend the like practice in dissimilar soils and situations, as it would be for a physician to prescribe the same treatment and remedies, to patients differing in strength, constitution, and habits.

The following addition to the Note, page XXIX, was omitted in its proper place.

Mr. Say describes the parasitic insect in the *larva* of the *Hessian fly*, scientifically. Its length, one tenth of an inch.—He styles it the *Ceraphron*, and classes it with the tribe of insects called *Ichneumons*. It deposits, according to the manners of its tribe, its eggs in the bodies of *larvæ*, (catterpillars,) and becomes perfect by the destruction of the *larva* of the *Hessian fly*. “Protected “by this indurated covering, the Parasite undergoes its change, and appears “in the perfect state, about the latter end of June. It seems probable that “this insect prevents the total loss of our wheat crops, by restraining the increase of the *cecidomyia*, within certain bounds.” He says it is often mistaken for the *Hessian fly*, by those who see it evolve from the *pupa* of that fly. And flights of the *Ceraphron* are erroneously taken for *Hessian flies*.

The *Ichneumons* are nature’s scavengers, destined to destroy the vermin which would otherwise overrun the earth. They breed in *catterpillars*, *corn grubs*, and other such reptiles, which perish in myriads, in consequence. When they are perceived coming out of the *larvæ* of other insects, it is inconsiderately alleged, that the corn-grubs, &c. turn into flies. It would be desirable that some naturalist would discover the parent of the *corn grub*; there being no absolutely certain, but many various opinions on that subject.

It is said that a parasitic insect is found in the incisions made by *locusts* in the branches of trees. No doubt an *Ichneumon*, placed there for destruction of the eggs of the *locusts*, to prevent their unbounded increase.

CORRIGENDA.

No. VI. Table of Contents, for *line* fences, read *live* fences.

Page 6, No. II. in the note, for *heretofore*, read *theretofore*.

No. IV. for "before it (the seed corn,) starts," read sprouts.

At the end of the second paragraph of No. IV. add

Transplanting, from a seed bed sown early, broad cast, in or convenient to your cornfield, or with supernumerary plants from other hills, is far preferable to using seed corn for supplying defective hills cut off by the grub, or otherwise vacant. *Plants* overtake and keep pace with those uninjured; but renewals with seed corn, seldom arrive at maturity.

In page ix. at the end of the paragraph, add—*Salt* is used for destroying grubs, worms, &c. and has been successful in killing or banishing the *corn grub*.

No. XIII. The following was accidentally omitted in the copy. Page xxvi.

Nothing requires more attention to the nature and qualities of your soil, than the use of *Lime*. If it be too lavishly applied, or too frequently repeated, without intervals of grass to furnish vegetable matter, or manures, either animal or vegetable, ploughed in, for the lime, (according to the country phraseology,) to *feed on*, it renders your ground *lime sick*; and reduces it to sterility. Our caustic lime must be applied in quantities very far less than the mild lime of Europe, if we would avoid turning a highly beneficial auxiliary into a destructive scourge. No certain rules, as to quantity per acre, can be fixed, without a perfect knowledge of the soil to which it is to be applied. In all cases moderate quantities at first, are the safest. Our common lime is here meant; as much depends on the kind of lime applied. It must therefore be the study of those who apply lime, to discover its composition, or what is called its strength; before they can form a correct opinion of its salutary or injurious uses. It would seem, that the *mild lime* had some fertilizing qualities *in itself*; otherwise the lavish use of it, whereof we read, cannot be accounted for.—Mere practical results being here intended, you must consult books for technical and copious discussions on lime.

Insert in page xxv. after "by necessity"—*Salt* your clover and other succulent as well as coarse hay. But over-salting diminishes the nutriment. More than a peck to a *ton* is superfluous. Half that quantity is often sufficient. Ten to fifteen pounds is usually an ample allowance.

In page xxvii. After "by crossing" strike out the words "from seeds of," and insert, (by applying the Pollen of one kind to the Pistil of another,)

☞ Errors in grammar or punctuation not noticed, are left for correction to candid readers.

The few books enumerated, are mentioned (their titles from memory) because they are written in our language in addition to their intrinsic value. The leisure of a young farmer, fond of mental improvement, could not be better employed, than in qualifying himself to read agricultural and other publications relating to his art, written in other living languages. The French and German, particularly, are highly useful for intercourse with foreigners arriving or being in our country. In these languages, he would find stores of information well worthy his profitable labour in acquiring them.



MEMOIRS
OF THE
AGRICULTURAL SOCIETY
OF
PHILADELPHIA.

T. M. Foreman, Esq. on Crawford Rye.

Read Nov. 1815.

Rose-Hill, near Savinton, Md. 9th Oct. 1815.

Dear Sir,

The enclosed letters, will show you how I came into possession of what Mr. Poole is disposed to call the Crawford rye ; but with Mr. Poole's permission, I know that this rye has been in the United States since 1812, for in that year, the late Joseph Tatnal of Brandywine, gave a few grains to a careless tenant of mine. In 1813, struck with its gigantic growth, I took possession of one head, and which is now increased to six quarts, which in the course of the present week, will all be dibled, in land about the average of the field. This rye was described to me, by the name of Napoleon rye, having been obtained from his celebrated botannic garden. Therefore, Napoleon rye it shall remain.

Comprising what I have grown, with Mr. Poole's sample, I can assert that the grain is already highly improved ; but of my stock, I have picked a tin cupful of

equal quality with the thirty grains enclosed, with the head in the tube, which you will with this receive. I do not wish you to open the tube, until you have a meeting of your board, that you may fairly compare my grain with the recently imported.

You will not only admire this gigantic head, but you will observe that the stalk is solid. If this stalk will resist the fly, we have then obtained a most valuable grain, which will enable us to arrange our seeding to more advantage. Formerly we begun to seed our wheat on the 20th August; and now never before the 3d or 4th of October; of course, we all have our wheat badly put in. Virginia and Maryland claim all improvements in the variety of winter grain, and if this rye has any merit, we shall find it out, and we will leave the carrots and beets to you.

But what would be a little beyond these last articles would be your giving encouragement to the bean seed, from which is extracted the most delicious oil, and with the advantage that it never becomes rancid, and improves with age, differing in this respect from all other oils. It grows to most advantage on poor sandy soils, such as the coast lands of Jersey, and the sands of Sussex and Somerset, and Worcester. If you could form a patriotic company, to erect a mill for the purpose, distribute seed, and purchase at two dollars a bushel all which might be offered, Philadelphia might supply the United States with this admirable oil, and the owners would soon find it a profitable business. Seed can be obtained from Georgia, from which I procured half a gallon, the want of a market, stopped the business. I mean now to reproach you for not thinking of me, when your society obtains samples of seeds. I devote myself to agriculture, and will make fair experiments.

I am, your obedient humble servant.

T. M. FOREMAN.

Account of Wire Fences. By White and Hazard.

Read January 8th. 1816.

White's-Town, 1st. Month, 2nd. 1816.

Friends,

The attention of the Agricultural Society having been frequently directed towards the discovery of substitutes for the usual expensive mode of fencing, and invited inquiries upon that subject; we make no apology for offering to their consideration, a plan which not only presents a diminution of expense, but also to the farmer a source of very considerable profit.

It is to form rails of wire, and posts of living trees. In order to render the advantages apparent, we shall first present a statement of the expense of a common post and rail fence, and then exhibit an estimate of the cost, and, we trust, a reasonable average for the produce of a fence erected on the plan which we would propose.

Cost of a common fence for 100 acres,	}	\$3,080
for 50 years.		
Cost of a wire-fence for do. do.		\$1,751

Leaving without any other consideration,	}	\$1,329
a saving, and consequent profit of,		

But in addition to this we must take into view, that the whole produce of the trees, will be a nett profit. The amount of this will, in some measure depend on the nature of the trees, as indicated by the richness of the soil, or the judgment of the farmer. We subjoin a catalogue of such

trees as have occurred to us, as forming a sufficient variety, either in regard to the consumption of the farm, or to the supply of market. We consider that after ten years from the time of planting,

244 Apple trees will annually produce at \$1 each.	\$244
30 Cherry do. - - - - 50cts.	15
20 Pear do. - - - - 50cts.	10
10 Plumb do. - - - -	3
10 Shellbark do. - - - - \$1.	10
50 Chesnut do. - - - -	12
20 Walnut do. - - - - \$1.	20
5 Butter nut do. (<i>Juglans Cinerea.</i>) \$1.	5
5 English Walnut do. (<i>Jug. Regia.</i>) \$1.	5
250 Button wood will spare from tops 24 cords } fire-wood at \$3. cord. }	72
Multiply this annual amount by the 40 years given	\$15,840
From which deduct the cost of the fence, as as above.	1,751

Producing a net profit of, \$14,098

To the credit of the wire fence in the period of fifty years.

The interest on the annual produce, it is presumed, will be sufficient to keep the fences in repair, not only for fifty years, but a period beyond calculation.

An additional advantage, will accrue from this disposition of the fruit, and other trees, as the soil they have hitherto occupied, may be thrown into arable and meadow land,

With regard to the strength of a wire fence, we do not hesitate to express our belief in its sufficiency to resist

any attack it may be required. We have given it a fair trial at the Falls, with the most breachy cows of the neighbourhood, and it is remarkable that even dogs avoid passing over it.

In case of the wire breaking by any casualty, it is easier repaired than any other fence.

The wire No 6. will sustain a weight of 1300 lbs. when stretched in the manner of a rail. No. 9. 750 lbs. and No. 11. 300 to 450 lbs. Ascertained by fair experiments for the purpose.

Respecting the duration of the wire, daily experience sufficiently speaks, that when protected by a coating of Linseed oil, or paint, an entire reliance may be placed on it.

We conclude by recommending the subject to the investigation of the society; informing them they may see a wire fence erected on this plan at R. Watkins Tavern, at the Falls of Schuylkill.

We are Very Respectfully,
WHITE & HAZARD.

HON. RICHARD PETERS,
President of the Agricultural Society.

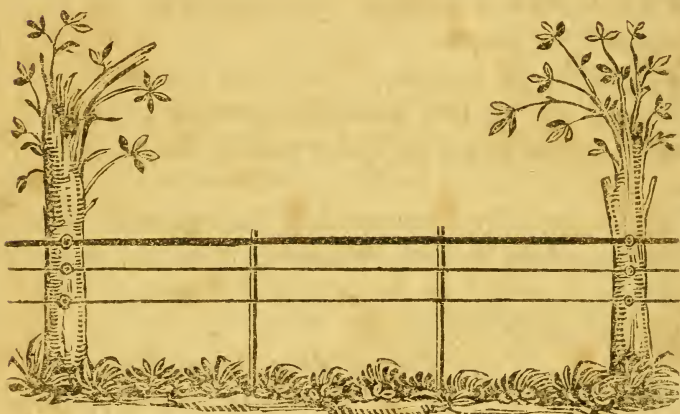
ESTIMATES.

Common post and rail fence 5 rail high:		
55 Rails at 10 cent make a fence 100 feet is		5,50
11 Posts	25	2,75
Putting up fence, holeing and pointing 25cts a pannel,		2,75
Cost of 100 feet		\$11,00

At the above rate 11 fields of 9 acres each,
and 1 field of one acre, will cost at once fencing, making 100 acres, \$1,540

In 50 years the expense on the fence will be
equal to another complete fence, and is \$1,540

Total cost without interest for 50 years, \$3,080



A Wire Fence, with living Trees, &c. With 4 Rails.

1 Top rail No. 6. weight 11lbs. at 16cts.	\$1,76
3 Under rails No. 9, weight 20lbs. at $17\frac{1}{2}$ cts.	3,50
6 Live posts, or trees, 18 ft. apart, at $12\frac{1}{2}$ cts.	0,75
6 Small posts to be set in with the live ones close behind, and at equal distances apart, so that when the dead posts decay, the wire can be attached to the live ones, by moving the wire rails a few inches back.	0,75
Planting trees and posts, and putting up fence,	1,50

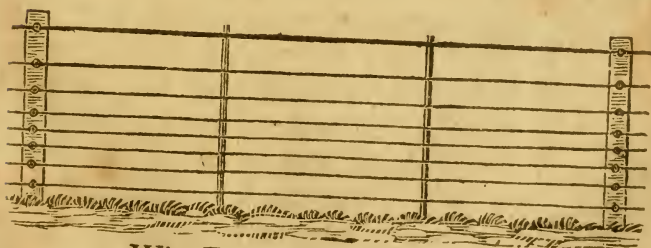
10 Space posts 2 in. square to set on the ground, or on a stone, the wires merely to run through, to keep them stayed in their places.	0,50
24 Rivet head nails.	0,24
Linseed oil, to coat the wires.	0,07
	\$9,07

But to fence against hogs, add,	
4 Rails of No. 12 wire, wt. 13 lbs. at 12 or 19 cts.	2,61
94 Round-headed nails.	0,24

Cost of 100 feet, against all cattle hogs, &c.	\$11,92
At the above rate 100 acres in 11 lots of 9 acres each, and 1 of 1 acre, will cost, (and will last 50 years.)	\$1,751

This fence will produce from the fruit, fire-wood &c. per estimate, \$396. Commencing ten years after setting out. so that in the 50 years their will be 40 annuities of that amount.	
Amounting in the whole to,	15,840

Nett profit of the two fences, in 50 years without interest.	\$14,089
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Wire Fences with Dead Posts.

5 Rails of No. 12 wire, 100 feet long will cost, including all contingencies for a complete fence, or say less than 70 cts. a pannel of 9 feet,	\$7,58
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Or with top rail No. 9. and 4 others No. 12.	
cost, less than 80 cts. a pannel,	\$8,09
Or 4 rails No. 9. about 80 cts. a pannel,	8,97
Or 4 rails No. 6. about \$1 a pannel,	12,12

NOTE.—The increased demand for wood fences, will *increase* their price.

But the demand for wire fences will *decrease* its price; as the greater the demand for wire the cheaper it can be made.

*On Spanish Peasantry, their improved Lime-Kilns ; and
economical Cooking Stoves. By Anthony Morris Esq.*

Read January 8th. 1816.

Madrid, October 15, 1815.

My dear Sir,

In my journey from Cadiz to Madrid, I availed myself of whatever time circumstances admitted, to deviate from the royal road (on which you meet with nothing but misery) for the purpose of inquiring into the habits of the Agricultural and labouring classes, always to me, the most interesting portion of every community. I found the endurance of every inconvenience of life, not only with patience, but with content, and cheerfulness, a general characteristic trait of the Spanish peasantry, connected with uniform habits of the most exemplary temperance ; but in the department of rural, civil, and domestic economy, I have only found in Spain two general objects of admiration and utility. Their economical use of the two important elements of fire, and water, is better understood, or at least is better applied, than in the United States ; the former, in the country, in the burning of lime, and in their cities in all culinary operations ; the latter, in supplying their cities with water, which is generally from springs in their *Sierra's* or ranges of mountains, and which is never altered from its perfectly pure transparency by any changes of weather : Of the actual mode of collecting and conducting it, I will endeavour to procure you a particular account. In the burning of lime, they use only the small shrubby brush-wood, and weeds, with which the vicinity of the Kilns supplies them ; none are thicker than your smallest finger, very few beyond the thickness of a pipe-

stem. The form of the kiln, or of the arch, in which the lime-stone is arranged, differs little from ours, except in the top of the kiln being very little above the surface of the ground; being covered with clay to confine the heat; and the arch within being of such a height from the bottom, as gives to the stone all the possible effect of the flame which these light and dry materials produce. The nature and properties of their lime-stone are precisely similar to ours, and I think their practice might be applied by our countrymen to great advantage, particularly on those farms in the lime-stone counties, where wood is scarce, and brush, and weeds, are in plenty; the former would be saved, the latter destroyed.

I am, Dear Sir,

With every respectful consideration,

Your obedient Servant and Friend,

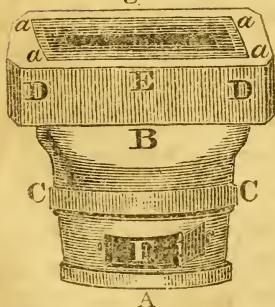
ANTHONY MORRIS.

DR. JAMES MEASE.

Sec. of the Phil. Agricultural Society.

REFERENCES.

Fig. 1.



A machine for heating irons; 1 foot 2 inches high. The height of the circular part from A. to B. is 10 inches; its diameter at the bottom 10 inches, at the band CC 11, and at the top B 1 foot 1 inch: On it and forming a part of the same piece is the square part DD 4 inches high to E. 1 foot 4 inches long and 11 inches

wide : In this of a rhomboidal shape, is a cavity, *a,a,a,a*, $\frac{3}{4}$ of an inch deep, 1 foot long and 7 inches wide, for placing the irons, after which the cavity continues for the coal 3 inches deep, $10\frac{1}{2}$ long and $5\frac{1}{2}$ wide at the top, and narrowing towards the bottom, where it is 8 inches long and 4 wide, and receives a grate of those dimensions, through which the fire receives air by means of a hollow within that communicates with the door F.

Fig. 2.

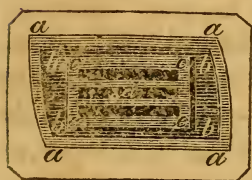


Fig. 2. Plan of the same machine as seen from the top, *a,a,a,a*, the cavity of receiving the iron *b,b,b,b*, for the *c,c,c,c*: the grate the hollow within.

Fig. 3.

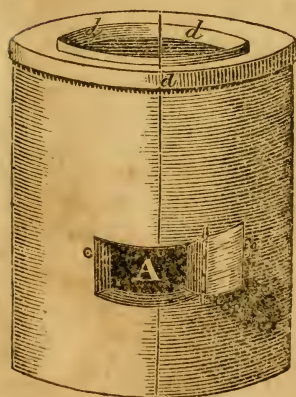


Fig. 3. Front view of an economical kitchen : 3 feet 6 inches high and three feet in diameter, of a circular form, at the side is a vent or door A. (for supplying air and for taking out the ashes) 14 inches wide and 7 inches high. Two iron bands *d,d*, *dd*, each two inches wide are, placed at the top one on the outside and one inside for holding the work together ; the outer

band is even with the surface, the inner one projects $\frac{1}{2}$ an inch above it, as seen also in figure 4.

Fig. 4.

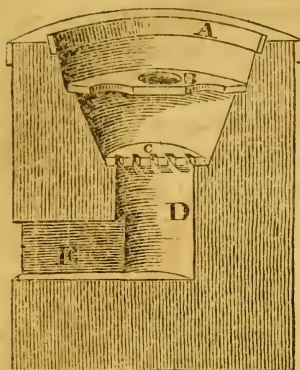


Fig. 4. Section of the preceding on the line BC, exhibiting the interior construction and proportions. A. Circular cavity 6 inches deep, 2 feet 3 inches in diameter at the top, and decreasing gradually to the perforated iron plate B, which is 1 foot 10 inches in diameter, and sustains the pucheros or pots. Here the diameter is lessened 2 inches and forms a projection for supporting the plate, and the cavity continues 9 inches deep and decreasing in diameter to the bottom where it admits the grate C one foot in diameter, on which is placed the coal. Under this continues the cavity D 10 inches in diameter, and 1 foot 3 inches deep, communicating with the door or vent E, the dimensions of which are noticed in the reference to figure 3.

Hill-side Plough. American Ploughs.

Read April 1816.

*Belmont, 5th April, 1816.**Dear Sir,*

For the information of the Society, I send a letter from Mr. Jefferson giving an account of the success of Gypsum in the country in which he lives ; also of the mode introduced by his son-in-law, Col. Randolph, of ploughing a hilly country. A description of Col. Randolph's plough calculated for the purpose, is also contained in it. The mode of ploughing is practised in the hilly countries of the North of Europe ; but they use a shifting mould-board, which is rapidly turned, on a vertical pinion, at every bout. I have requested a draft or model of the plough and share, which I will present to the Society when I receive them. Please to extract the parts of the letter relating to agriculture, and file the extracts. After which I will thank you for the return of the letter. I also send a letter from our friend and member Robert Barclay Esq. of England, giving an account of the trials of some ploughs I had made for him. The society will be, no doubt, gratified, when they perceive that we are capable, in any thing, to reflect back to that country, the light we have received from it, on the subject of our institution. These ploughs have fully proved on their first trials, (and they will perform better when the British ploughmen are more accustomed to them,) my assertions in the note in

our second volume, pages 144, 5. I send also an extract from Evans and Ruffy's Farmer's Journal; giving an account of one of the trials of two of Mr. Barclay's American ploughs; very favourable to those Implements. The three horsed plough is an excellent instrument; but great injustice has been done to it, by its being worked only with *two* horses abreast, or four oxen. The *three* horses *abreast*, are essential to its movement, because it is calculated for the third horse, on the off side, to keep it to its work; and the power of the whole is equally divided, and correctly balanced. As to the objection that the plough (if this be the one meant) will not clear itself in foul ground, and is not calculated for heavy and stiff soils, or stony ground, nothing can be more unfounded, as they will find on executing the directions I have transmitted. Detach the coulter, and it will turn in Buckwheat, clover, stubble, and any foul cover of weeds, or grass, to the greatest perfection: I think quite as well as Ducket's skim coulter plough. There is no ground, capable of aration, too *heavy* or *stiff* to resist the power, or perfect operation of this plough.

I send some seed of the orange coloured Mangel Wurtzel, which, being highly esteemed in Europe, I wish some of our members would carefully cultivate, to assist me in obtaining seed for distribution, and also to spread the knowledge of this excellent root; which has obtained in Europe, and in England particularly, (from whence it was sent to me by Mr. Barclay) a celebrity beyond any other, as food for cattle. The mode of culture will be seen in our 3d volume. Mr. Barclay informs me, that the orange coloured root grows more under the surface, than the mottled or white kinds; but

I do not value it the more for this habit.* The largest and best roots are those growing, for the most part, above ground.

Yours very truly,
RICHARD PETERS.

MR. ROBERT VAUX,
Sec. Philad. Soc. for promoting Agriculture.

* I have found on two years experience that my apprehensions of the inferior value of the yellow Mangel, were well founded. My seed of the white kind has degenerated. The mottled is the best. Success in the culture of this root mainly depends on the purity and goodness of the seed.

R. Peters.

January 7, 1818.

Monticello, March 6, 1816.

Dear Sir,

I have to thank you for the copy of your discourse on agriculture which you have been so kind as to send me. I participate in all your love for the art. We are indebted to you for much of our knowlege as to the use of the plaister, which is become a principal article of our improvements, no soil profiting more from it than that of the country around this place. The return of peace will enable us now to resume its use. My son-in-law, Col. Randolph, is perhaps, the best farmer of the state; and by the introduction of the horizontal method of ploughing, instead of straight furrows, has really saved this hilly country. It was running off into the valleys with every rain; but by this process we now scarcely lose an ounce of our soil.

A rafter level traces a horizontal line around the curve of the hill or valley, at distances of 30 or 40 yards, which is followed by the plough; and by these guidelines the ploughman finishes the interval by his eye, throwing the earth into beds of six feet wide, with large water furrows between them. When more rain falls than can be instantly absorbed, the horizontal furrows retain the surplus untill it is all soaked up, scarcely a drop ever reaching the valley below. Some two or three years ago, I mentioned to Mr. Peale this method of ploughing, and I think he has informed me of his having since practiced it with satisfaction. It is probable therefore you may have heard of it from him, if not through some other channel.

Mr. Randolph has contrived also, for our steepest hill-sides, a simple plough which throws the furrows always down hill. It is made with two wings welded to the same bar, with their planes at a right-angle to each other. The point and the heel of the bar are formed into pivots, and the bar becomes an axis, by turning which, either wing may be laid on the ground, and the other then standing vertically, acts as a mould board. The right-angle between them however, is filled with a sloping piece of wood, leaving only a cutting margin of each wing naked, and aiding in the office of raising the sod gradually, while the declivity of the hill facilitates it's falling over. The change of the position of the share at the end of each furrow is effected in a moment by withdrawing and replacing a pin. The little paper model enclosed may help out my description of the share.

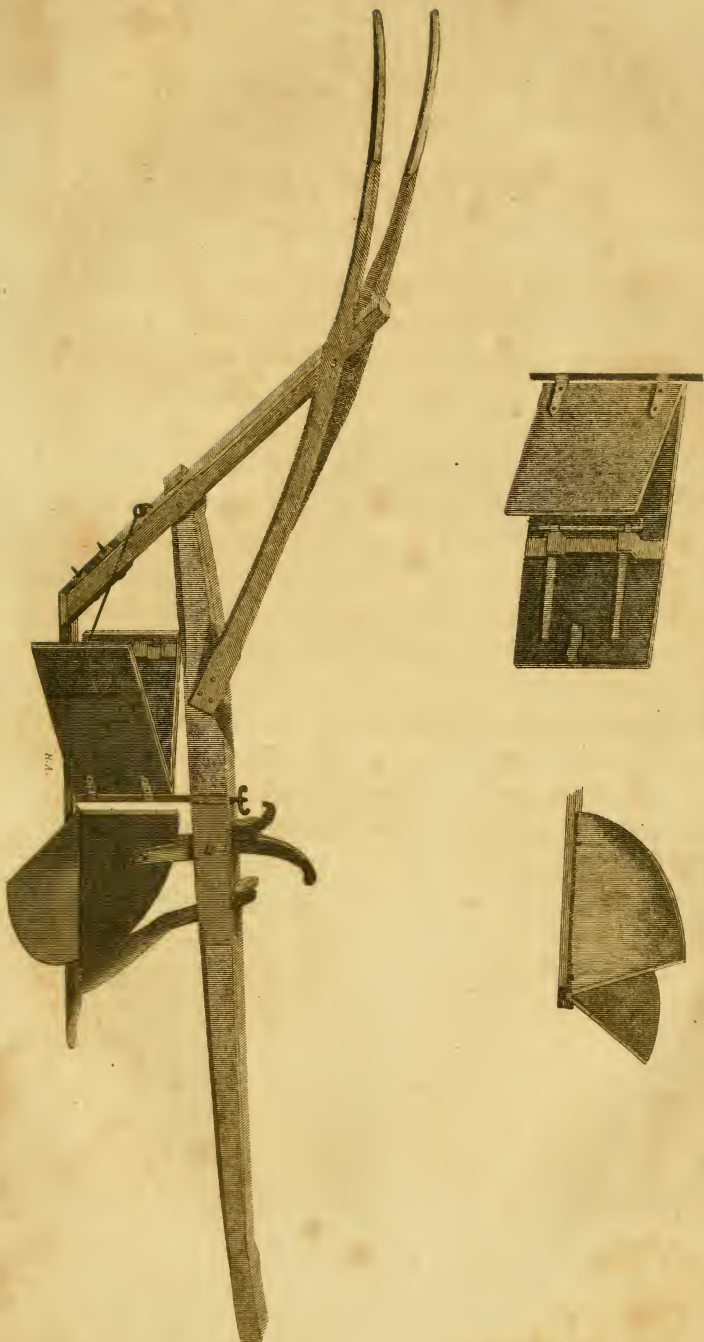
THOMAS JEFFERSON.

Description of the Hill-side Plough.

The mould boards are not plated with thin iron, as usual, to prevent the wearing of the wood: in doing that the iron is made to extend beyond the edge, so as to scrape the furrow clear, if required: that may be done to the angular, as well as to the plane piece of the mould-board, as to the latter only, which will be found quite sufficient. In lands full of stone, or roots, where the frequent strains given to the forceps by the obstructions to the angle of the cutting-share, which forces it downwards, might cause too much play on the first, it is supported by something like a long and curved staple cleft in the head to receive the forceps and permit its play, while it is kept from moving laterally and getting loose: the prongs of this staple are driven into the under surface of the beam on each side of the forceps. Neither of the additions here mentioned are often wanted. Such ploughs have been in use on two farms in the S.W. mountains of Virginia for 9 years. By them the tallest clover is completely turned under on the sides of the steepest hills. They work from 8 to 10 inches with 2 small mules or one stout horse.

* Col. Randolph has, by Mr. *Jefferson's* desire, been pleased to send a working model of his Hill-side Plough; which can be viewed in the Society's Room.

HILL-SIDE PLOUGH.





J. Parker, Esq. of Kent County, Maryland ; his account of Sedge Wheat, and successful experiments by changing Seed.

Read March 1816.

Long Mead. Kent Co. Md. Feb. 18, 1816.

Sir

As the proper season for investigating the cause of the disease in wheat, noticed in the Memoirs Vol. I. page 124, and Vol III. page 422, (by some called sedge, by some stud, but which I think may as properly be called stunt) is approaching, I have thought proper to state to you such facts on the subject, as have occurred in the course of my business. I have for fifteen years had an opportunity of noticing its progress, and although I have not been able to ascertain its cause, I have discovered a remedy, which has in a great measure rendered it harmless.

I. It first appeared in this neighbourhood on a farm I now own, on an inconsiderable eminence. The then proprietor, a gentleman of nice observation, and a practical farmer of much experience, discovered that the wheat had on that spot, for several crops, began to decline in March, and although the disease affected only a small part at first, it increased considerably every crop. He tried various methods to remedy the evil: as the ground afforded a proper scite, he made his treading floor, and stacked and trod his wheat there, but treading the ground hard for that purpose, had no effect: he planted the ground in corn, and instead of sowing it with wheat (the usual practice here) he let it lie over, and had it ploughed very deep in the winter; in the spring he sowed

it with oats, and prepared it for wheat, in 1804. In 1805 the stunt had increased considerably, and very much injured the crop. In 1806 I became possessed of the field, and by the practice I have adopted, I have never been injured by the stunt there, but have made good crops, at least of straw.

II. A temporary cow pen, or feeding yard, was made in a field, for the purpose of feeding cattle through the winter, (the common practice here) the fence enclosing the pen was removed in the spring, the manure carted to a distant part of the field, and the ground planted in corn in April, and sown in wheat in October; the corn was very luxuriant, but the wheat on the area of the feeding yard was intirely killed in March; and what was very extraordinary, I could trace the zigzag line where the fence had stood, distinctly on the wheat. The disease had not extended any further than the ground had been covered by the litter in the cow-pen, which in the spring was perhaps two feet deep. This was the first appearance of the stunt in this field.

III. In one of my fields where water sometimes stands after heavy rains, the stunt appeared a few years ago, on a small spot about thirty feet diameter, and from that spot has extended considerably.

IV. In the winter 1804—5, a severe season for snow and sleet, in one of my fields sown with red-bearded wheat, two small spots, distant from each other about two hundred yards, were exposed for some time to very severe frosts, the snow having been drifted from those places. In March, the wheat began to perish, the ground soon became bare, and, on examination, I found the wheat was stunted, and the spots mentioned produced nothing

but weeds. This was the first appearance of the stunt on this farm.

V. On the adjoining field to the last-mentioned, and near one of the bare spots before described, after ploughing the field, in August, to prepare it for wheat, a cow-pen was made for the purpose of milking there, and to manure the ground; this field was sown in red-bearded wheat, and had never been diseased before; but the crop was materially injured around where the cow-pen had been, but the area of the pen was very luxuriant.

Those two last cases, occurred on a farm divided by a public road forty feet wide, from the farm on which the three first cases were noticed; the manure on each farm was distributed where necessary, on the farm where collected, and not taken from the one to the other.

I will now state to you the remedy which I have applied, and, will also, give you the information I have received from others.

In the month of June in the year 1805, passing through the field first mentioned, then sown in red-bearded wheat, I observed that where the bearded wheat had been entirely destroyed, there were a number of plants of smooth wheat growing: the plants standing single on good ground were very luxuriant, and, I judged from that circumstance, that the worm required other food, and that the ground would produce a crop of the smooth wheat. I accordingly procured some wheat of the kind we here call Brunswick wheat. It is a dark coloured, late, smooth wheat, and not a profitable crop on common ground, but at that time almost every other kind had been discarded for the red-bearded, which was known to be preferable. My experiment succeeded completely;

I could mark to the furrow, where the different kinds were sown: the red-bearded was entirely destroyed, but the Brunswick produced a good crop.

Believing I had discovered a remedy for what I thought a great evil, I conversed with a number of farmers, and found where the two kinds of wheat had been sown in the same field, and divided by a head-land, or turning, that the red wheat was destroyed and the Brunswick not injured, and in all cases the Brunswick wheat was not stunted. I continued to sow this wheat on diseased ground, for several years, but I did not like it, and procured other kinds. I got some smooth wheat from Wye river on this peninsula, and this wheat also escaped the stunt. I procured from Delaware some red chaff smooth wheat, which had a high character, but this was entirely destroyed early in April; I then tried the old yellow-bearded wheat: this was delicious food for the worm.

We have a smooth wheat lately introduced into this part of the state, which has a brown or purple straw, and called blue straw wheat. It is a valuable acquisition to those who have been injured by the stunt; it is a yellow plump grain, ripens as early as the red wheat, and yields well from the straw. One of my neighbours sowed some of this wheat on stunted ground in 1813, and although the season 1814, was wet and unfavourable, the grain was good and it yielded well.

I procured some of this wheat in 1814, which in 1815 produced a good crop on stunted ground. I, last spring, examined a number of fields, and inquired of gentlemen who had sown it, and could not discover that in any case it had been injured. In my own field I had a posi-

tive proof of its excellence, for although I had the blue straw grain sown over more ground than had previously appeared to be diseased. I found the evil had increased; the blue straw was thick and luxuriant where it joined the red wheat; the red was much injured for several lands next to it.

In order to ascertain whether the red wheat would thrive on stunted ground which had been sown with Brunswick, I ploughed and enclosed a small piece of ground in a field which had been much injured when sown in red-bearded, but had produced two crops of Brunswick. I sowed this enclosure with red wheat, it did not appear to be injured in the beginning of April. At that time the fence was removed, a number of the plants were transplanted into the garden, and the field ploughed and planted in corn, those plants continued to prosper, and I had sanguine hopes that the experiment would succeed; sometime in May they were accidentally destroyed in the garden, but from their appearance the last time I viewed them, (I did not reside on that farm,) I believed the red wheat would escape the disease. After the ground had produced the Brunswick, and in order to prove it fully, I sowed the ground from whence the plants had been taken to the garden, and indeed all the stunted ground then in tillage, with red wheat, but I suffered for my temerity, the stunt had increased considerably, and my crop was injured more than usual, this ground produced last season a good crop of blue straw.

One of my field corners which was opposite to a lot divided by the public road before-mentioned, had been partially affected in 1809. In 1810, I sowed it in wheat from Wye, but it had been damaged: it came up too

thin, and the crop was indifferent ; but it was not stunted. In 1812 I sowed it with red-chaff smooth wheat from Delaware, in April 1813 it was all destroyed. I ploughed it up, planted it in Indian corn, and sowed it with smooth wheat from Wye, and had in 1814 a very abundant crop of straw. In 1815 the field opposite to this lot produced a crop of red wheat, but about two acres adjoining the lot, only divided by the public road was very much injured.

I have known stiff and light, wet and dry, soils affected with this disease, where manure had not been applied ; and I have stated these facts, which have occurred on my own lands, to shew the whimsical character of the disease, to invite observation and experiment, to discover its cause. I believe it to be a worm, and, as far as my observations have extended, I have never, in any instance, known it to be distributed in the manure, which I have generally applied to such parts of my land as most required it.

I will observe Sir, that my inquiries on this subject, have not corroborated my own observations. I have been informed by one gentleman, that a crop of oats, by another that a crop of Buckwheat, and by a third, that liming his stunted ground had cured the disease. The oat crop has not succeeded with me ; the buckwheat I have not tried, but I would rather suppose the gentlemen mistook the complaint. The lime I have more confidence in, but the remedy *here* where lime is very dear, would be impracticable. Mr. Binns, of Virginia, has recommended sprinkling brimstone over, or around the spots affected : but that application would be too expensive, and I believe would be ineffectual.

I have been informed by a friend that he knew a quantity of coarse manure drawn into a field in Autumn, where it lay in heaps until the spring, when it was spread, and the ground planted in corn, and sown with red wheat; the wheat was entirely destroyed on those spots where the loads of manure had been dropt, this case compared with the 4th case stated, deserves consideration, in both instances it appeared to be the effect of the weather, and differs very materially from the case of the cow-pen.

The facts herein stated, as of my own knowledge, are correctly related, I felt a deep interest in the investigation of the subject, as it is a complaint not noticed by any European writer on agriculture, which I have perused, and I believe it would become much more injurious than the Hessian fly, but for the remedy which is now applied. I suppose it is an American disease, or it would not have been overlooked by the scrutinizing eye of a Young, and other British writers, however, they too may err.

“ I believe the Hessian fly to be accurately described in Duhamel’s *Elements of Agriculture*, vol. 1. p. 269, as quoted from Chateauvieux, and noticed in Mill’s *Husbandry*, vol. 3. p. 43.

Your’s respectfully,

JAMES PARKER.

DR. JAMES MEASE.

NOTE.

The stunted, or sedge wheat, according to the facts shewn, in the foregoing communication, affords, among a thousand others, an additional proof of the necessity of change of both

the species of crops, and the seed. It also proves the wonderful advantage to be derived from studying the nature and habits of insects and other depredators. Here is a strong instance of CHANGE being indispensable, even in the same genus of grain. It would have availed nothing to have taken Mr. Cooper's mode of selecting the best ears of the red chaff bearded wheat. None of that kind succeeded, or would have escaped the disease, or as I suspect, the ravage of the insect, which may be so minute as to escape detection; though our correspondent, Mr. *Evans*, alleges he could find no insect in his stunted wheat. The fact of the stunt always appearing in the cow-pen'd or dunged ground, shews the probability that the disease or its author, was resident in the straw or chaff used in the pens. Insects are curiously inclined to feed on certain plants, in preference to others; and their predilections are so unaccountable, that they attack those of apparently different natures. When more numerous than the favourite plants will sustain; they, 'tis true, devour all vegetation indiscriminately. We know not to what cause to ascribe their common predilections. Last season the potato fly (*lytta vitata*) was in great plenty on my grounds. They nearly ruined a small patch of potatoes I had planted, for experiment, in my garden. A large bed of fine melons grew adjacent to the potatoes, and were not touched by the fly. They passed over several beds of other vegetables, and attacked the leaves of my scarcity roots, the first time I ever knew any insect or vermin annoy them. Their ravages were really mortifying to me, who am much attached to this root, and very desirous of bringing it into general notice and culture. None of the common beets were touched by the fly, though within their reach, on their passage to the mangel wurtzel. And yet there is quite as much affinity between the two kinds of beet, as there can be between the red-bearded and the blue-straw wheats. I have frequently recommended inquiries into the habits of insects; and it would be highly important to discover whether or not insects cause the stunt. I know it will be difficult to establish any certain

criterion to prove peculiar propensities. But plants most subject to injury by certain insects, might be noted, from time to time. The potato flies, last summer, were found in plenty on the *pothos fetida*, or skunk-weed; and on the *actæa racemosa*, or black snake-root, in the woods. If insects are not the cause of the Stunt, the facts stated by Mr. Parker, nevertheless, shows that it is wise to change the crops on the infected grounds. We know that *smut* and other maladies, are propagated by the grain, chaff or straw, of precedent crops. And, to prevent this evil, writers have recommended burning such chaff or straw. If, however, the manure made with such straw and chaff be applied, and it appears by many facts, that however Mr. P's experience may be, wheat has been stunted on ground manured with cowpen'd dung, let the crop be entirely changed, from the one producing the straw and chaff. The account given by our correspondent, of even a change of the species of the same genus of plants ensuring perfect safety to the crop succeeding that tainted with infection, shews that crops of entirely different kinds must be doubly secure. I have no doubt but that if in Maryland, and other states, wherein the stunted or sedge wheat prevails, they would sow clover, or other grasses, on their grain fields; the cow-pen'd or dunged spots would throw up abundant grass crops, though those of grain had been destroyed; and thus they would be remunerated for the labour bestowed on their fields, for an abortive crop of wheat. Indian corn grew luxuriantly on the cow-pen'd ground. The change of one wheat for another, seems, however, to have succeeded with Mr. Parker, better than it did with Mr. Hollingsworth; and yet the success of the latter, was encouraging; for his white wheat throve tolerably, when the red chaff perished. 2 vol. 287—8. My proposition to winter fallow, or any other mode of cleansing their fields, will never be attempted, whilst the southern farmers adhere to their hereditary bad style of farming, handed down from father to son. If the evil be a disease communicable from straw, or other cause inherent in the manure; or if it be occasioned by insects; their mode of sowing wheat contemporaneously with indian

corn, allows no time or opportunity for cleansing their grounds, by tillage and exposure to the ameliorating influences of the atmosphere. One day they will discover, that they had better contract the scale on which they farm; and cultivate smaller fields well, rather than labour over, and double-crop, vast surfaces, when a less space, well cultivated, would yield them incalculably greater profits. Would it not be advisable to try experiments with the Flemish steep of copperas, which may operate to purge away malady, or the eggs of insects from the grain?

Salt in moderate quantities, or reasonably *salt-water*, is found to destroy insects and their *larvæ*, worms, &c.; and as it also assists the crop, it is well worthy of trial.

*On Threshing out Wheat by a Roller, by Nicholas
Ridgeley, Esq. of Dover, in Delaware.*

Read April, 1816.

Dover, 30 March, 1816.

Sir,

The encouragement given by the Agricultural Society of Philadelphia, to farmers and others, to make communications of useful and practical improvements in husbandry, induces me to lay before you, a method of treading out wheat, which is simple, expeditious, and within the power of any man, willing to employ ten or twelve dollars, in facilitating the operations of his farm. I think I am not mistaken in believing, that an equally easy and advantageous mode of separating wheat from the straw has not been discovered by, or known to the mass of farmers of our country. I speak with more confidence of its utility, because some of our best farmers have adopted it with the greatest success; and because I have myself, more than fifteen years, pursued the course I now recommend, and know, from actual experience, that it is not liable to any reasonable objection, unless it be that *treading out grain* forms an objection not to be removed by any benefits. Let this objection be thought what it may, at present it ought to have no effect, for eight tenths, if not more, of all the wheat which is carried to Brandywine, Philadelphia or Baltimore, from this peninsula, is trodden out by horses, and will continue to be so, until some cheaper and better plan can be invented.

The manner of treading wheat, which I propose for consideration, is with a roller drawn by three horses. A broad-axe, saw, auger and drawing-knife, are the only instruments necessary in its construction. A small quantity of timber, and a few pounds of iron from the blacksmith, with the price of the labour, make up the expense, as will be seen in the following description.

Take a piece of good, tough white oak, 6 feet 6 inches long, and 12 or 15 inches square. Then make it 8 square, and reduce each end to a circle, a little and gradually pared down, beginning 3 inches from the end, and secure the ends by iron bands two inches wide. This is necessary to prevent the wood from splitting. In the centre of each end of the roller is to be inserted an iron axis, to which the frame is to be fixed. The axis should be an inch in diameter, and should penetrate 12 or 14 inches into the roller, and project 4 inches beyond it, to be received into the frame. The part which enters the roller must be square, the other round. On each square of the roller bore a number of holes, with a two inch auger, at the distance of 6 inches from centre to centre, in a direct line with one another, beginning on any square as the first, near to the iron band, and so till 12 holes are bored. The next square must be begun about 3 inches from the iron band, and so let every other square be bored, by which means there will be 12 holes in 4 squares, and 11 in the other 4; and the holes will be in every other row, opposite to each other; or, in common phraseology, they will hit and miss. Let pins of well seasoned white oak be prepared, 12 or 15 inches long, and 2 by 3 inches square. The ends must be rounded and inserted into the roller, the longest sides of the pins being placed lengthwise

the roller, and be driven well home. Then stretch a line from one end to the other of the roller, on the pins, so that the pins on the off end, should be marked at the distance of 11 inches from the roller, and at the near end, at 8 inches; then saw off the pins where thus marked, and the Roller will be ready for the frame. The pins are thus gradually shortened in order that the roller may be fitted for running in a circle. To the roller, is to be fixed a frame made of any strong wood, projecting about a foot in front, next to the horses, beyond the pins, and the same distance behind. It must be secured by mortise, and tenon, and pins, so as to be taken off when not in use. For preservation a small roof must be made to cover the roller. The frame may be separated and put any where out of the weather.

Such a roller will last until it is destroyed by dry-rot. The whole cost will be ten or twelve dollars. By boring a hole in the centre, from end to end, and allowing the timber to become perfectly seasoned, before it is made, and keeping it covered when not in use, it will last fifty years, or more. The pins may become very dry, and drop out, but they may easily be made fast enough by wedging with wet straw. The iron axis at each end soonest becomes loose, and is more troublesome than any other part of the machine, for wooden wedges are not sufficient to hold it. But when well made, and put in skilfully, it will continue firm in *green* wood, several years, and longer in dry. After the timber is bored and well seasoned, an iron axis to pass entirely through the roller, might be fixed immovably, so as to remain good a life time.

The above described roller is adapted to three horses. The gradation of the pins is suitable to a yard of 80 or 100 feet in diameter.

On the state of the treading yard, and weather, depends altogether the success in treading.

The yard should be 80 or 100 feet in diameter, clear of stacks and fences. The soil should be close and binding, and free from sand and gravel. The richer it is, the better will be the yard. There should be a space, exclusive of that necessary for treading, on which wheat, hay, straw, and every thing of the kind may be stacked, round the yard, and close to its edge. The yard must rise a little in the middle, and when first made, should be well and perfectly trodden with horses. All little inequalities should be filled up with proper dirt wheeled in, and so trodden, till the whole face of it is smooth, hard, and even. Let the wheat be stacked round the yard ready for treading; though previous to stacking, the yard should be perfectly clear, in order that waste wheat may be swept up and saved. The yard must always be kept free from grass and weeds, and should be on the south side of the barn; and there ought to be no trees in the neighbourhood, by which it may be shaded. At any time after harvest, when the business of the farm will permit, and the weather is suitable, wheat, oats, &c. may be trodden out. The winter is the best season, when the ground is hard frozen, and the weather is dry. Wheat then treads better, and is free from dust. The next day after the fall of a deep snow, I have had the snow brushed off the stacks, and removed from the yard, and have trodden five or six days successively with great advantage. As soon as all the grain is trodden out, a fence should be run round the yard to secure the stacks of hay, straw, and other fodder; and then corn-stalks, leaves, potato-vines, and rubbish of every kind ought

to be drawn on it; and cattle, horses, sheep, or any other stock, except hogs, be kept there as much as possible, to tread and pack it, and keep it covered. The covering should not be removed until a day or two before harvest. This is indispensable. If the yard is not kept hard, and free from grass, much grain will be lost, and much labour required to restore it to tolerable order. And no plan is so effectual as that of feeding stock on it.

As to the weather little need be said about it. Every person knows that dry weather is better for any operation to be performed on grain, even if it is under a roof, and more especially if it is to be done out of doors, than wet, or even a damp state of air. In July and August wheat treads very well. To obviate the inconvenience of dews, the yard, and also the stack, should, the evening before, be lightly covered with straw. In the morning the straw can be removed in fifteen or twenty minutes, and then there will be no impediment of that sort. It is better though to wait an hour or two, that the moisture may be exhaled, than to work on damp ground, or with damp straw; because, in either case, the wheat will tread tough, and much of it will be beaten into the earth. A judicious farmer will accommodate his treading to the other business of his farm. As soon after harvest as the time can be spared, he ought to begin, and so occasionally proceed, until the whole crop is ready for market. If it be practicable, all the grain should be got out before winter; and then the yard will be ready for feeding on, and for being put in a state of preparation for the next year's operations.

Whenever the farmer has determined on treading, he

should the day before examine his roller, and see that it is in order. Then let him have four rollers, two of them with teeth 8 or 9 inches long, and 3 or 4 inches apart; and two others with teeth two inches long, and about 2 inches apart, and four wooden forks. The large rakes will act on the long, coarse straw; the smaller ones on such as is fine, and mixes more with the wheat. But it is better to use the rakes with long teeth altogether, than to suffer a careless hand to work with the small rakes. By inattention much of the wheat may be carried off with the straw.

Thus prepared, an active fellow, or two, should mount the stack; *and cut the bands of the sheaves*, and push the wheat off as expeditiously as possible; and the hands below must carry and place it in a circle, about ten or twelve feet wide, round the yard, in the track or path on which the roller is to run, until the whole floor is laid down. Three horses should be then fixed to the roller, and proceed at a pretty good trot. As soon as the horses are set in motion, the scattered wheat from the inside edge of the circle, and on the outside, should be raked up, and thrown upon the floor. I here suppose five hands to be on the yard; one, a boy, will ride, the other four will place themselves in pairs, and divide the yard by the eye, as equally as possible; and immediately begin to turn the wheat, with the forks, from bottom to top, keeping it as near as may be in its circle. One of each pair should take the inside of the circle, the other the outside, and work in conjunction. Each pair should travel round the floor, as they turn the wheat, keeping a proper distance, and taking care to avoid the horses, and by no means to stop them; and so continue

until the wheat is finished. The roller should run on the inside and outside of the floor, as occasion may require. This can be judged of by a slight examination of the straw. The middle of the floor commonly treads out faster than the other parts, because the horses and roller will unavoidably run more on it. It will be now and then proper that a couple of the hands should lay by their forks, and go along the inside and outside of the floor, and rake up, and throw into the middle of it, the scattered untrodden wheat which lies out of the track of the horses and roller. The expedition of the work will greatly depend on the men in turning the wheat. The wheat, through the whole course of treading, must be continued of its original breadth : it will work much lighter, than by suffering it to be gathered up into a deep, narrow, body. Sometimes it will be laid too thick on a particular spot. As that is discovered in treading it ought to be run over to a thinner place. As soon as the grain is all out, let the men throw the straw with their forks, off of the wheat, into a narrow circle, then take the horses from the roller, and let them be trotted round 10 or 15 minutes, and the men continue raising and turning the straw. This will disengage the loose wheat from the straw. The straw is to be removed. Some attention will be required in handling it so as not to take off wheat with it. This will depend on the care of the men using the rakes. When the great body of coarse straw is carried off, the small rakes are to be used in collecting the fine, short, light straw. A smart willing hand, will very soon become expert in this, and indeed in every part of the business. The straw being disposed of, the wheat **must** be pushed into the centre of the yard, where it will be out of the way of the se.

cond floor. Then begin and proceed as before. As soon as the second floor is trodden out, the straw removed, and the wheat pushed off, if the day's treading is finished, some of the hands should be set to sweeping. The fan is now to be put to work. This stage of the business requires some management to keep all the hands properly employed. One should carry wheat to the fan, another turn it, and a third attend the hopper; the others may sweep, carry wheat into the barn, or do any other part of the work as occasion may require. A little experience will soon regulate these things.

Each floor of wheat on a yard of 100 feet diameter, should be sufficient to turn out 25 or 30 bushels. But it is to be remarked, that more work may be done, and with greater ease to man and beast, by laying down too little, than too much wheat on a floor.

It is not necessary to place the wheat with any regard to the heads and butts. Neither is any part of the straw to be removed, until the whole floor is trodden out.

In good weather, a floor of 30 bushels may be trodden out in two hours. I mean after the horses and roller are put on it. If three more horses, and a rider can be spared to follow the roller, it will hasten the work very much.

In January 1803, I had trodden out in one day with a roller and three horses, followed by three others, and four hands on the floor, besides riders, two stacks, averaging 45 bushels each; but it was not fanned. The wheat and chaff were pushed into the middle of the yard. In January 1809, I had trodden, in five days, five stacks, each containing fifty bushels. The wheat was fanned

and carried into the barn, and the straw stacked, each day.

I proposed to George Cummins, Esq. a senator for this county, in our state legislature ; and one of our most successful and skilful farmers, the following questions, and received from him, after consideration and examination, the following written answers. He uses the roller.

Q. What is the average number of bushels of wheat which you tread in a day ?

A. Sixty ; and I have trod from that number to 88.

Q. How many horses do you put to the roller ; and how many other horses are employed on the yard ?

A. Three horses to the roller ; and three others rode by a boy in the common mode of treading.

Q. How many hands answer ?

A. Two boys to ride, and four to keep constantly turning the wheat from bottom to top, until it is all trod out.

Q. What is the greatest quantity of wheat that you ever trod out in a day ; and how many hands and horses were employed ?

A. Eighty-eight bushels. The roller and three horses to it, three other horses, four hands and two boys made the force employed.

Q. Besides the roller, what other implements do you use on the yard.

A. Wooden forks for turning the wheat, and rakes.

Q. What quantity of wheat do you generally put on a floor ?

A. From 20 to 25 bushels.

Q. What number of floors do you tread in a day?

A. Three. And all the wheat trod each day, is chaffed, and put into the barn.

Q. The size of your yard to tread, and to stack on?

A. Seventy feet in diameter for treading, and 12 feet on each side for stacking.

Mr. Cummins has added the following note to his answers. "Joseph Foreacres treads with a machine about the same size of mine. He never uses more than three horses with it; and generally gets out in a day, about fifty bushels. Some days he exceeds that quantity, with only himself, two boys between 15 and 20 years old, and one small boy to ride. He chaffs the wheat, puts it into the barn, and generally stacks the straw.

"J. Cummins with six horses or mules, treads 60 bushels; frequently more, with four hands, and two boys to ride. He chaffs, and puts up the straw, &c. the same day."

There are some objections to this mode of getting out wheat; and so there are to the flail, and to the Scotch machine. Let any man though, try the method of treading here recommended, with his yard, roller, rakes, forks and fan in order; the weather suitable, and the hands a little experienced, and I am persuaded that he will deem it superior to any other plan yet discovered, as applicable to the great body of farmers. The Scotch machine is too expensive for common use; the flail is too tedious; and neither of them will do the work better, I conjecture, than the roller. The flail I know will not. The threshing machine I never have seen; but

the most accurate account which I have read of it, warrants the conclusion here made.

OBJECTIONS TO TREADING.

1. *The wheat must be stacked out of doors.* This does not necessarily follow. If the barn stands on the edge of the yard, the bands of the wheat may be cut, and the wheat thrown into the yard, almost as expeditiously, as off the stack, however, it will consume more time on the whole, and therefore stacking round the yard should be preferred. A stack, well put up, will stand 18 months without leaking a drop of water. The wheat will be as sound, and the straw as good, as when first stacked. This I know from experience, although it was improper to suffer it to remain so long.

2. Again, *the stack is liable to injury from fowls.* This may be obviated by a close rail-fence round the yard; and by securing the top with briars, brush, or timothy hay, or hay of any long grass which will lay close.

If the stack is elevated by a few blocks, or large stones, and strong fence-rails, so as to raise it a foot or 18 inches from the ground, to admit dogs and cats occasionally to go under it, rats will not do half the injury as if the wheat is put directly on the ground, or on rails laying on the ground.

3. It has been said that threshing with the Scotch machine "more generally separates the grain from the straw, than *possibly* can be accomplished by treading." This I do not believe when the roller is used; though I never saw the Scotch machine, and probably the wri-

ter, who made the assertion, never saw wheat trodden out with a roller. Properly managed, in good weather, and on a good yard, treading with a roller will disengage every grain in *good* wheat. It is true, if the wheat is small, and has not well filled and ripened, and especially if it has been cut rather green, it will be very tough, and a few heads will retain the wheat, but it must be very ordinary, and not worth the labour of and process to separate it. Wheat which has grown on land producing from 6 to 20 bushels, or more, to the acre, I sincerely believe will not retain one half of one per cent. It is well known that good wheat threshes easily, and clear, compared to such as is small and shrivelled. And so it is in treading, with this difference, that the roller and feet of the horses act proportionally more expeditiously, and more effectually than the flail; and I really suspect, as completely as the Scotch machine, merely in separating the wheat from the straw. Many people lose much by treading (and so they do by threshing), but it is owing to their own slovenly management.

4. "The great damage which the grain must receive, when treading, by the dung, &c. of the horses during the process," has been opposed to this mode of getting out wheat. There is certainly some justice in the objection; but, for all, the injury is not perceptible. I never observed in trodden grain any damage worthy of complaint. In the winter, the dung is hard and of little moment. In the summer the horses may be confined a day or two in the stable; and fed on dry food, which will harden their dung, and put them in excellent condition for treading; and they will perform the work with better spirits, than when taken with a full belly from grass.

This should always be done when they are employed in any kind of labour, in the summer. My horses when used in ploughing or harrowing Indian corn, turning fallow, ploughing-in wheat, &c. are constantly kept on dry food, except, perhaps, once a week, they are turned to grass, for the sake of opening their bowels, and keeping them in good health.

I have been told that the wheat of Duck Creek Neck, in this county, is more diligently sought for, and commands a better price, at Brandywine, than any wheat which is carried to that market; and it is all trodden out with horses. It is said to be preferred to the nicest thrashed wheat of Pennsylvania and New York.

5. *The labour to the horses have been objected to the process of treading.* I have before, in some degree, noticed this objection. It may additionally be observed, that in treading out 50 or 60 bushels of wheat, by making two or more floors, the horses will not be employed, the utmost space of time, more than six hours, and at intervals, so as completely to rest them. In very hot weather care will be required; but not more so than in any other kind of labour. Perhaps it is more fatiguing than ploughing, but its continuance is not so long; and if the horses are driven to excess the fault will be in the superintendent, and not in the work itself. In fifteen years, not one of my horses has sustained the least damage by treading.

6. *It may be supposed that the straw is not so good as threshed straw.* If the straw is equally well preserved it is not inferior. The long food which my horses gene-

rally eat in winter, is straw of trodden wheat. They are nice judges of good eating ; and I never observed them to refuse well preserved trodden straw. The more closely straw, and indeed hay, is packed, and kept from the air, the fresher it will be, and the more kindly horses and cattle will eat it. On its good preservation depends the retention of its good qualities. I have heard more than one gentleman of judgment and experience say, that they thought horses preferred trodden to threshed straw ; and they accounted for it, by conjecturing, that by treading, it was made softer and more palatable. Sometimes I buy a little threshed straw, raised on small lots, and I never find that my horses make any difference, if it be all alike sound and fresh. Trodden straw requires a little more care in stacking ; and after the stack is put up, it should be secured by a few rails or poles until it is well settled.

7. *The chance of damage from rain* has been stated among the inconveniencies of treading wheat. I admit that there is such a chance, and I believe that it sometimes happens ; but a farmer must be very unskilful in the changes of the weather, or foolhardy, who will expose himself to the *probability* of such a chance. In fifteen years I have not once had a floor of wheat caught in a shower ; nevertheless this circumstance is to be taken into the calculation, but I will venture to say that no prudent man, with tolerable judgment, ought to hesitate a moment about adopting the roller, on this account.

It may be imagined, from the preceding observations, that I have a mind to resist the introduction of the Scotch threshing machine. I have no such intention. My pur-

pose is to recommend a mode of getting out wheat which is suited to general use. If a farmer has but thirty or forty bushels, he and another hand, and two horses may completely tread and secure it in a summer's day; if he has a thousand, or five thousand, his hands and horses must be in proportion; and between harvest and the first of March, it may with the greatest convenience be all prepared for market. In the autumn, he may tread, and clean and sell; if the price be not to his mind, it may lay ready for the spring market. At any season, wheat in the chaff keeps admirably in a barn, and by treading and carrying it in, chaff and all, without any fanning, it may afterwards be cleaned at leisure. The winter next after the first embargo, in Mr. Jefferson's presidency I had my crop of wheat trodden out, and put into my barn, in the chaff. The next year's crop, the succeeding winter, was treated in like manner. In the spring of 1809, when the embargo was removed, I went to work, and fanned, and cleaned the whole, and found it all perfectly sound and merchantable.

The roller which I have described was first invented, as I have been informed, and applied to treading wheat, by Mr. Benjamin Sylvester, now deceased, of Caroline county, in the state of Maryland. John Clayton, Esq. a judge of our supreme court, and an excellent farmer, introduced it into this county. My friend, George Cummins, who never suffers any improvement in farming to escape him, adopted it immediately after seeing its operation at Mr. Clayton's, and has continued its use more than twenty years. He annually raises from 500 to 800 bushels of wheat, and perhaps an equal quantity of oats; and he thinks that the great desideratum in threshing

wheat has been attained by the application of the roller to this purpose.

I have the honour, to be, Sir, with very
great respect, your most obedient servant.

NICHOLAS RIDGELY.

*Account of Bennett's clover, and turnip sowing machine
by George Logan, M. D.*

*To Richard Peters, president of the Philadelphia Society
for promoting Agriculture.*

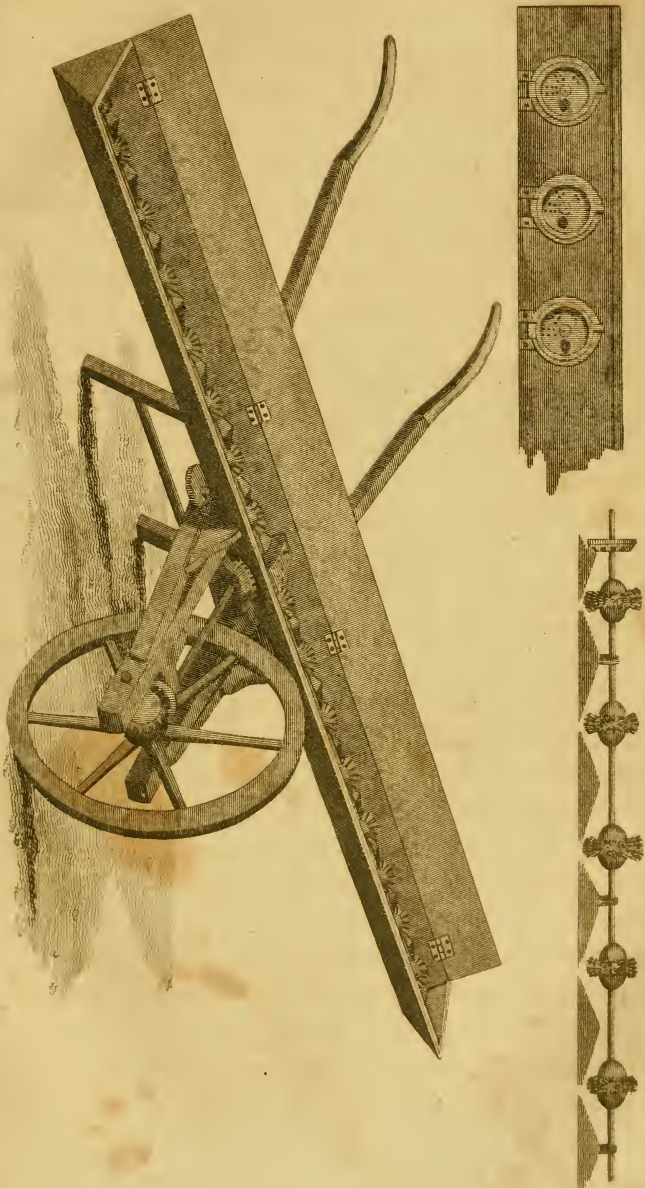
Read March, 1816.

The cultivation of clover is considered the basis of a rotation of crops, on which is founded the improved system of agriculture in the United States. Many of our husbandmen are discouraged from adopting this valuable mode of farming, on account of the delay and difficulty in sowing an extensive field with light grass seeds by hand. It is therefore with great pleasure I inform the society, that I have received from a friend one of Bennett's machines, for sowing grass or turnip seeds, which promises to be a most valuable addition to our implements of husbandry. The experiments made with it at Stenton, in sowing clover and timothy seeds, exceed my most sanguine expectations. A man pushing the instrument before him, in the same manner as using a wheel-barrow, will sow twenty acres per day, uninterrupted by wind or a light rain.

A perambulator is connected with the machine, to ascertain the quantity of ground passed over, whilst employed in sowing.

William Lehman, an ingenious carpenter in Germantown, has made one of these machines for Albanus Lo-

BENZET'S MACHINE.





gan, which he has used with satisfaction : but without the perambulator, which renders the original machine more complicated in its construction, without adding much to its utility.

I shall with pleasure exhibit the machine to any person desirous of seeing the same. Enclosed I send you the instructions for using Bennett's agricultural machine, as accompanying the same.

GEO. LOGAN.

Stenton, March 9th, 1816.

A Model of the above Machine is deposited in the room of the Agricultural Society.

*Instructions for using Bennett's Agricultural Machine,
as accompanying the same.*

When you get into a field, set your regulator, and lay the box across the carriage with the regulators behind, then put in the seed and drive straight across the field ; place a stick to wheel back to, and so continue till you get to the end of the field, and then wheel round the head land, as you will find an advantage in leaving that till the last, it being required to turn in. The best way to turn is to drop the handles, and go and mark a place to set the wheel, to go back, and lift the machine off the ground. The two straps are to buckle the box to drive it to the field. When you want to empty your seed, take off your box, turn it on the joint edge, open the lid a little, and the seed will run to the end into a half gallon measure, which is requisite in the field to fill the box with. If your lands are ploughed the same width or double the width of the machine, you will have no occasion for sticks, as the furrows will be a guide : if the lands are not so wide, stop a

hole at the end so as to sow one land at a time. Once going over the land is sufficient. When you want to wheel without sowing, turn the cog of the wheel on the other side.

Instructions for setting the Machine.

When you want to sow mixed seeds, such as rye grass (sometimes called bents' trefoil, broad clover, Dutch clover, lop, or any other mixture of grass seeds, let them be well mixed before they go to field. Turn the large hole opposite the brush: the hole at full size will sow twelve or fourteen gallons on an acre, half the hole will sow about seven gallons. Three handles are sent with three iron pins in them; and if you intend sowing two gallons on an acre, put in the smallest, and bring the largest part of the hole to the size of the pin. If you sow three gallons, take the next size; if four gallons, take No. 4. If you measure the seed into the box, you will find by the acre, whether it sows too much or too little, as there is a wide difference in grass seeds. Should it sow more than you wish, set the hole a trifle less; if not enough, set it a little larger. In sowing turnips, one small hole at each brush will sow about two pounds on an acre; two holes six pounds: but of Sweed's turnip not quite so much, the seed being larger. If you intend sowing one pound of turnip seed per acre, put one hole to every other brush, and a blank to the others; and if the seed be good, and the season kind, it will produce a good crop, and come in lanes, if you harrow the same way the seed is sown; which will need less labour to hoe them. In sowing broad clover, five holes will sow about eight pound on an acre; of Dutch clover it will sow about eleven pounds per acre, and so in proportion of any other seed of the same size.

The short hand of the perambulator goes round once in

five rods, and the long hand once in eighty rods. The distance you walk for an acre of ground when using the box at full length, is two hundred and thirty-five rods.

*Communication from James Parker, of Maryland, on
Disease called Stunt in Wheat.*

Read March 12th 1816.

Long Meadow, Feb. 18th, 1816.

Sir,

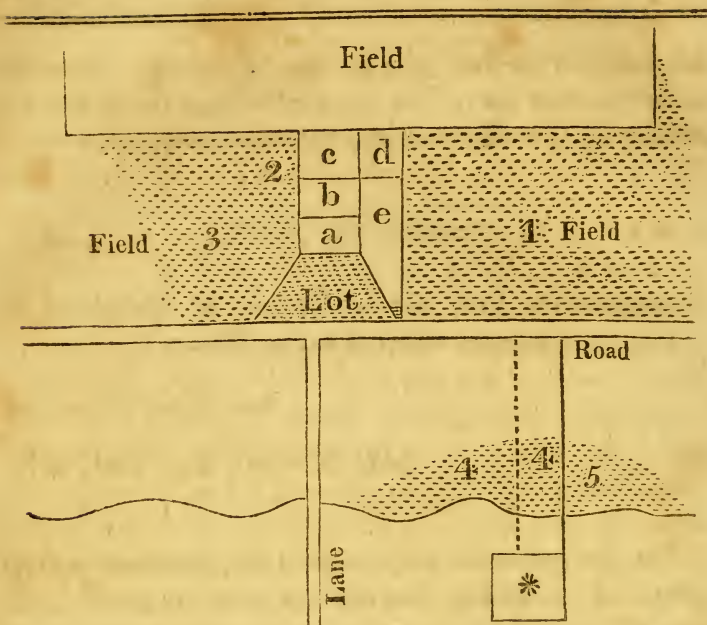
For the particular inspection of the *president* and the officers of the society, and for the view of those members who may think the matter interesting, I have given a rough sketch of my land, which although not done with mathematical accuracy (not having used my scale and dividers), will shew the operation of the disease as far as it has yet appeared. The vice president knows well the situation of my land, being in the practice of passing it, at least semi-annually, and will see that the sketch is nearly correct.

Yours very respectfully.

JAMES PARKER.

DR. JAMES MEASE.

This note and the following cut ought to have immediately followed Mr. Parker's communication, page 19.



EXPLANATION.

- 1 Where the stunt first appeared.
 - 2 Winter cow pen or feeding yard.
 - 3 Ground sometimes covered with water.
 - 4 4. Spots from which the snow drifted 1804, 5.
 - 5 Summer cow pen.
 - a House and yard.
 - b Garden.
 - c Barn and stables.
 - d Treading floor.
 - e Outlet to well and road.
 - * Enclosure for house garden, stables, &c. &c.
- Diseased ground.

Note—The dotted parts show the diseased wheat.

Account of the Virginia Cyder Apple, called Gloucester White, by James Mease, M. D.

Read July 1814.

Having heard from William Coxe, Esq. a very favourable account of a cyder apple in Virginia, which went by the name of Gloucester White, Robertson, or Taliafero apple, and being told by him that Mr. Jefferson could give some information concerning its origin, I wrote to him for it; and deeming also the history of the Hugh's crab (a cyder apple of more general note), well worthy of inquiry, I requested him to favour me with such facts as he possessed respecting it. The following was his reply.

Monticello, June 29, 1814.

Dear Sir,

On my return home after an absence of five weeks, I find here your letter of 24th May. Of the history of the Hugh's crab apple, I can furnish nothing more than that I remember it well upwards of 60 years ago, and that it was then a common apple on James' river. Of the other apple after which you inquire, I happen to know the origin. It is not a crab, but a seedling which grew alone in

a large old field near Williamsburg, where the seed had probably been dropt by some bird. Major Taliaferro of that neighbourhood remarking it once to be very full of apples, got permission of the owner of the ground to gather them. From this he made a cask of cyder which, in the estimation of every one who tasted it, was the finest they had ever seen. He grafted an orchard from it, as did also his son-in-law our late chancellor Wythe. The cider constantly made from this, was preferred by every person to the crab or any cyder ever known in this state, and it still retains its character in the different places to which it has been transferred. I am familiar with it, and have no hesitation in pronouncing it much superior to the Hugh's crab. It has more body, is less acid, and comes nearer to the silky Champaign than any other. Major Taliaferro called it the Robertson apple from the name of the person owning the parent tree, but subsequently it has more justly and generally been distinguished by the name of the Taliaferro apple, after him to whom we are indebted for the discovery of its valuable properties. It is the most juicy apple I have ever known, and is very refreshing as an eating apple. Accept the assurance of my great esteem and respect.

THOMAS JEFFERSON.

DR. JAMES MEASE.

The Gloucester White, Taliaferro, or Robertson Apple.

A White thin skin, with many small red spots on the stem end ; very juicy, of a keen aromatic taste. The

fruit hangs till late in September, ripen quick, and fall, as soon as ripe, the tree at the same time drops its leaves. Its size is about that of a large red-streak. An immense bearer, a very fine cider apple, and by many, thought the finest table apple of the season, in Virginia. The branches are stubbed. Mr. Jefferson described it as much superior to the Hugh's crab for cyder, as that is to any other fruit.

Dear Sir,

The above description of the "Gloucester white" is extracted from my book. I have supposed it of Virginia origin, that is, first cultivated there, but cannot vouch for the fact.

Very sincerely and respectfully yours,,

WILLIAM COXE.

DOCTOR MEASE.

Burlington, May 21st, 1814,

On Smyrna Wheat, by Samuel Hazard.

Read December, 1815.

The accompanying specimens of wheat are a part of a bag which I have brought from Smyrna in Turkey with a view to distribution by the society. Having unfortunately had a long passage, the season for sowing has too far elapsed to make a fair trial of them. Notwithstanding, I am desirous that the experiment should be made as far as practicable, to ascertain whether the introduction of this variety of wheat into our country may be attended with great advantages. I have never heard of its being before attempted, but should this have been the case an opportunity will be afforded to confirm the result of former experiments, and supply the seed from the growth of our own country.

No. 1 is the *hard* wheat and which I had particularly in view in bringing the grain to this Country. Its hardness seems to be the quality which recommends it to attention, this property rendering it less liable to the attacks of the insects either in the field or granary. It is this grain which constitutes the principal commerce of the Black Sea, and the sea of Azof; and is from thence carried to Malta and various parts of Europe. At Malta, and in the Islands of the Archipelago, there are capacious subterranean Magazines which being filled with this wheat, are closed from the air; and continued unopen'd till oc-

casion may require, which sometimes does not occur for several years : the grain is then found as good as when it was stored. In Turkey, I had no opportunity of determining the quality of the flour which this wheat would produce, as their millstones are of too soft a nature to grind it completely, which of course would prevent the flour from being well boulded and exhibiting its true colour: the bread made of it under these circumstances was rather dark, but very sweet. It is however more generally mixed with a softer wheat of which you have a specimen herewith marked no. 2. The proportions vary according to circumstances. At Malta I understood they were four sixths of the hard, and two sixths of the soft wheat ; thus mixed, the bread becomes whiter.

No. 3. is a sample of the two kinds as they are generally mixed, and sold in the Smyrna market for family use,

The soil in which they are produced is generally very light, and frequently calcareous, and is merely turned up by a slight wooden plough drawn by oxen or Buffalos. It is therefore probable, that under good cultivation, the produce would be more abundant and the grain much larger

The season for sowing corresponds, nearly with our own : but their winters are less rigorous and wetter, the rains commencing about the latter end of September, and continuing with occasional intermissions of a few days, till March or April, after which there is no rain for several months. It is this difference which in my opinion forms the principal obstacle to our cultivating foreign grapes and other Eastern fruit.

They produce no hay in Turkey, and as a substitute for it, feed their horses and other animals upon the Wheat and Barley straw. It is cut into pieces of 2 or 3 inches in length, and appears to be eaten with the same avidity that hay is by our Cattle. It must therefore be more nourishing than our straw, or we are not sufficiently acquainted with this property of it. It is also probably more valuable as a manure after having been subjected to the digestive processes of the Animal. Barley is used instead of oats.

The Bag of wheat will be disposed of in any manner that the Society may direct.

SAMUEL HAZARD.

Philadelphia, December 17, 1815.

Elastic Tubes, for giving immediate relief to Choked or Blown Cattle, Invented by Dr. Monroe, Professor of Anatomy in Edinburgh.



These Tubes have long been found of the greatest utility in preserving the lives of animals, when choked or blown from eating too freely of clover, turnips, &c. and only require to be more known to be in general use. The wood mouth-piece being placed in the mouth of the animal, and buckled round the head, assists the operation and protects the tube ; the cup end of which will immediately remove any obstruction in the throat, and the other end will cause the immediate escape of the confined air.

Farmers, graziers, and keepers of cattle in general, should not be without an article of such great utility ; by means of which, when cattle are blown, the air is not only more certainly and expeditiously discharged than by stabbing the animal, but the danger is avoided which stabbing occasions, not so much by the irritation which the wound creates, as by the air and other contents of the stomach getting into the cavity of the belly between the containing parts and the bowels, which excites such a degree of inflammation as too frequently proves fatal to the animal.

*On the cultivation of the woad plant, by H. S. Dearborn,
Esq.*

Read November, 1816.

*Brinley Place, Roxbury, near
Boston, October 31st, 1816.*

Sir,

Understanding you take great interest in the agricultural pursuits of your country, and as President of the Agricultural Society of Philadelphia, I herewith transmit a number of copies of a work, which I have translated from the French, on the culture of Woad or Pastel and the use of its blue pigment in dying.

Desirous of testing the correctness of the experiments which are therein detailed, of the best methods of cultivating pastel, and extracting the indigo from the matured leaves of the plant, I sowed a piece of ground early in May, in drills, three feet apart; and at the first weeding, thinned the plants, so as to leave them six inches apart.

On the 15th of August, I cut a part of the leaves, which covered one sixtieth part of an acre, and pursued the process contained in the information upon the art of extracting indigo from the leaves of pastel, published by order of His Excellency Montaliret, Count of the French empire and minister of the interior, contained in the treatises transmitted.

The experiment succeeded to admiration, and I herewith send you a sample of the article obtained.

The fermentation was perfect at the expiration of 48 hours. The liquor being drawn off from the vats, one bucket of lime water, prepared agreeably to the directions contained in the treatise, was added to two of the liquor, and then agitated with a small wooden rake for fifteen minutes, when a most copious white froth arose to the surface, which soon assumed a bright blue colour; this froth was carefully skimmed off, and put into earthen bowls to dry, and gave me a quantity of "fleuree," as mentioned at page 138.

The green floculi were deposited in two hours. The superincumbent yellow liquor being drawn off, an ounce of sulphuric acid to every bucket of liquor diluted with water, was poured into the green precipitate, which instantly changed it to a most beautiful cerulean blue: cold water was then poured into this admixture, and violently agitated for ten minutes.

Twelve hours after, the liquor was drawn off, and the blue deposition put into cloth filters to drain. In twenty-four hours, the woad was perfectly drained taken out and put into a box with a linen bottom, which was placed in an airy situation under cover. At the expiration of seventeen days, it had become a tenacious paste; it was then taken out with a wooden knife, and pressed into small boxes to dry. In two weeks the indigo was perfectly dry.

At the expiration of twenty days, the plants which had been cut, were grown sufficiently large to cut again. Thus seed sown in May, would give three cuttings a year in this northern climate; but if sown in September, there might be four, if not five cuttings a year; as the

plants are not injured by the frosts of winter, they would in this way be fit to cut in June.

From this experiment I am satisfied the following quantity of indigo could be made from an acre of ground. —One cutting from one sixtieth of an acre gave of woad half a pound. One cutting from an acre, therefore, would have given thirty pounds: four cuttings would give one hundred and twenty pounds. The present price of indigo is two dollars per pound; therefore one acre of land cultivated with pastel, would produce to the farmer two hundred and forty dollars.

I wish you to distribute some of the books I have sent among the different Agricultural Societies in the state of Pennsylvania, and the remainder in such manner as will best tend to diffuse a knowledge of the advantages which the agriculturists and dyers of your state may derive, from the cultivation and use of pastel.

If the present pacific state of the world is adverse to the extension of the cultivation and use of pastel, as a dying material, it is nevertheless important, that the advantages which the different sections of our country may reap, at some future day from this plant, should be known when less favourable circumstances shall combine, to afford the colouring ingredients now so easily obtained from every part of the globe.

During the war, indigo was four dollars a pound in New England and Philadelphia.

It is of the first consequence to a nation, that it can at all times be able to rely on the resources of its soil, and industry, for not only the necessities but the luxury of life.

The resources of the United States are as yet, very imperfectly developed, but the rapid advances which are now making in chemistry, mineralogy, botany, agriculture, and the mechanic and fine arts, warrant the most favourable anticipations of the future glory, prosperity, happiness, and real independence of our Republic.

Besides the advantages resulting from the cultivation of woad, as a pigment for dying, it is indispensably necessary for fermenting the *indigo vat*. For this purpose, the green leaves are used or they are made into cakes, balls or *pelotes* as described in the treatise.

It is a notorious fact, among well taught, scientific and experienced dyers, that a deep, permanent and brilliant blue cannot be produced, unless the *indigo vat* is fermented with woad.

It has long been used in France, Germany, and Holland, in preparing the indigo vats in the best manufactories of those countries, and is now used in England; for it is found impossible to imitate the justly celebrated *naval blues* of France without it. A more perfect fermentation is thereby produced, and the particles of indigo consequently more uniformly held in solution. The colouring pigment prepared in this manner attaches itself so firmly to the fabrics, that cloths thus dyed, appear of a deep, uniform and beautiful blue; the colour does not rub off and never fades, by exposure to wet, heat or the air, but remains permanent and unchanged.

There is no art less perfectly understood in this country than dying; and it has been owing exclusively to the exertions of the first chymists of Europe, that it has been reduced to a perfect system, and the whole process conducted on known established principles.

Formerly there was a mysteriousness in the process, which, for a long time, excluded all attempts at investigation. Those who practiced the art, made it a point to keep as important secrets, whatever they knew, and like manufacturers of glass, suffered no inspection of their labours, lest they should be robbed of an imaginary treasure. There were no means within their power of detecting the causes of failure in the preparation of their vats, for they were ignorant of the chemical effects of the different ingredients used. They merely knew from practice or tradition that a certain combination of materials, made a red, blue, yellow or green dye, and if from an injudicious admixture, the anticipated result did not take place, they merely said *they had* “*bad luck.*”

Long custom had created prejudices which forbid instruction, and like many individuals of every mechanic art, the dyers laid it down as an axiom, that nothing useful could be learned from books, or instruction communicated by individuals who had not served an apprenticeship and laboured in the same vocation.

The vast strides which have been made in knowledge during the last fifty years, have not been confined to the schools of the Literati, or only known to the secluded philosopher.

Useful discoveries in the arts, instead of merely giving eclat to the laborious investigator, and patient experimentalist, have been extensively disseminated.

The perfection of European manufactures is attributable to the march of chymical investigation.

The superior manufactures of Painter's colours, earthen-ware and porcelain, soap, medicinal preparations, the working of metals, the art of dying and distilling and

the astonishing improvements in agriculture, are some of the important effects which have resulted from the chemical pursuits of the learned individuals, societies and academies of the last half century.

Although the United States have progressed in civilization and the arts, in a manner unparalleled in the annals of nation, still much remains for inquiry; and it is the duty of every citizen, to contribute by every means within his power, whatever may tend to advance the best interests of all classes of society, and render our nation industrious, learned, independent, and happy. I send you a quantity of woad seed, which please to distribute in such a manner as you think best.

I have the honour to be Sir,

Your obedient servant,

H. A. S. DEARBORN.

HON. JUDGE PETERS.

President of the Philadelphia Society for promoting Agriculture.

On preserving Indian Corn from frost, by Samuel Morey of New Hampshire.

Orford N. H. Sep. 5. 1816.

Dear Sir,

I send you the result thus far, of an experiment now making, to save corn from the effects of early frost. This season of late frost, and snow, gave little hopes of raising a single ear of corn in this country, after the severe frost of the night of the 21st of August. What corn I had was but little injured by that; but it having been cut down by a late frost in June, the kernel was not half grown in the most forward ears. We were threatened if not with a famine, certainly with another severe scarcity. I desired my hands, with a hoe, to remove the earth from a standing hill of corn, forming a small ditch or trench about 3 feet diameter, they then took or pulled up about ten or twelve other hills, placed them in the ditch round the standing hill, and formed a stook in the same manner as is practised, when corn is cut up: the earth was then hoed back on to the roots. The weather for the next ten days was very cold, and we had two or three other frosts in that time, and although the standing corn was preserved in a great measure from its effects, by fogs, as before, yet its progress toward maturity, was scarcely perceptible: not so with that I had removed into warmer quarters: I thought could perceive every day the kernel regularly filling. In ten days most of the forwardest ears I examined, would have done well to pick for green corn, although not an ear was to be found in the field of stand-

ing corn in any measure fit. At the end of twelve days, being threatened with another severe frost, I had removed into clusters in the same manner about an acre and a half more. Nothing can be more promising than the experiment thus far. It is now the middle of September, many of the ears in the stooks first put up, appear now to be perfectly well filled and are beginning to turn hard, which is not the case with any of the standing corn.—I see as yet no reason to doubt but that, had it been known that corn could have been saved, or in a great measure in this way and at so early a period, nearly the entire crop might have been preserved to the great comfort and relief of the people : all the stalks and leaves are in perfect order for fodder.

Should you think the object worth mentioning to your agricultural friends, and they think it worthy their attention, it will be in a way for all the benefit to be derived from it to society, that can even be expected to be realized.

Yours,

SAMUEL MOREY.

DR. MEASE.

*On Wine made from Cyder and Honey, by James
Parker, Esq. in a letter to the Secretary.*

Read August 1816.

*Head of Chester, Kent county,
Md. July 20th, 1815.*

I have received a letter from the hon. Judge Tilghman, enclosing an extract from the minutes of the Agricultural Society of Philadelphia, requesting to be furnished with the process for making wine, such as the sample I took the liberty to present to the Society. In compliance with the request, I will observe, that I was first induced to make the experiment by reading the receipt of Mr. Cooper, of New Jersey, in your edition of Willich's Domestic Encyclopedia; and I commenced the process as directed, using instead of the washings of honeycomb, pure boiled honey, and French brandy, instead of apple brandy as used by Mr. Cooper. I used in my first essays in 1808, apple brandy, peach brandy, and French brandy; the result was, that the apple and peach brandy, produced very pleasant liquors, but the French brandy exceeded my expectations. I have continued to make experiments when I could procure suitable fruit, and have completely demonstrated, that my composition will invariably produce a cheap fine wine.

The cyder, of which the sample sent you, was made, was pressed the latter end of November, 1812 ; and passed through a cloth to take out the pummice, and put into casks, with above two gallons of honey to the barrel : it remained in that state until March, at which time the fermentation had ceased, it was then racked off into clear casks with two gallons of French brandy, and one gallon of bounce, made of French brandy and Morella cherry, added to a barrel. About midsummer it was fined in the usual way, with whites of eggs and new milk ; I began to use it about the first of November : this has been my invariable practice. I have ascertained that every kind of fruit will not answer ; I have failed twice, with an apple peculiar to this part of the country, called scrivener's red, which makes a very pleasant but not strong cyder.

The apple which I would prefer and which has never failed is the cart-house, and the pennock : I have tried the cart-house separately, and have ground them together, and have always succeeded ; I have also used loaf-sugar instead of honey and find it answer equally as well ; but it is not so cheap. The morella cherry-juice is not essentially necessary, but it is a considerable improvement.

It is unnecessary to observe that the strength, or sweetness, may be made to suit any taste ; by increasing or diminishing the quantity of brandy or honey, and perhaps the only fault which has been found by gentlemen, judges of wine, is, that my wine is too sweet ; however, this objection may be easily remedied. I have used less than two gallons of honey to a barrel in my last essay, and I think it will be the best I have made.

I will send you a demijohn of it in a few days, by the

Smyrna packet, which you will please accept.. The sample I submitted for the inspection of the society, was two years old, that in the demijohn I intend for you is one year old, and I think will be preferable to the first at its age. I will send you also a bottle of the first sample, that you may compare the quality.

In December 1813, I pressed off three barrels of cider made of the Cart-house and Pennock, from my own orchard, and I procured a barrel of the scriveners, very carefully prepared by a neighbour, and added the honey : when I examined them in February, I found the last barrel was pricked and I very imprudently mixt it with a barrel of the Cart-house, expecting to restore it ; in consequence, both casks are indifferent, but I think they improve : one other of my casks had been a rum cask, and although it had been well scalded it gave the wine a rum flavour, which it still retains ; that in the demijohn is of the other cask, made of the Cart-house and Pennock at the same time. Had it not been for those circumstances, I could have furnished you with a quarter cask, as you desired ; the older parcel I wish to retain for my own use, to furnish samples and to ascertain its improvement. Last year my orchard failed, and I did not make any, at present I have a fine prospect for fine fruit.

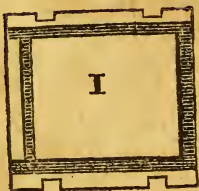
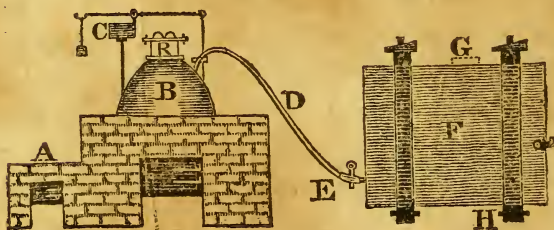
I am Sir, with respect, &c.

JAMES PARKER.

DR. MEASE.

Description of a Steam Apparatus for boiling Potatoes, Turnips, &c. for cattle, communicated in a letter from Mr. John Bell of Overton-House, England, to Mr. Edward T. Grant, of Shrewsbury, New Jersey. Communicated by Reuben Haines.

Read September, 1816.



- A Pot to heat water for the boiler.
- B Boiler.
- C Cistern of hot water to supply the boiler regulated by a float and valve.
- D Steam-pipe 2 inches diameter.
- E Stop-cock to turn the steam on or off.
- F Side view of the cistern or steaming box.
- G Opening in the top to put in the potatoes, &c. to be tight closed while steaming.
- H Strong wood coupling.
- I Bottom floor of the steaming box.
- K Second floor raised 9 inches from the bottom and made of bars of cast iron.

The steam is introduced into the open space betwixt the floors by means of the pipe D, and passes through the grate bars to the potatoes.

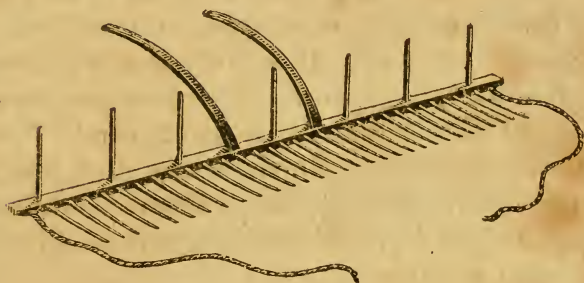
- L Coupling frame to keep the cistern firm.
- M End view of the steaming cistern without the door.
- N N Hinges to hang the door.
- O O Frame bolted to the sides for the door to shut against.
- P Floor of grate bars.
- Q Space for the steam betwixt the floors. The door to be made to fit as tight as possible, to prevent the steam from escaping.
- R. A door for a boy to go in, occasionally to clean the bottom of the pan from sediment.

My steaming cistern, or box, is made with five large flags, or planks, and a wood door, the whole firmly held together with a strong wood coupling frame; they should

not be less than two inches thick, and dovetailed together, as the steam is very powerful. My Boiler contains about seventy gallons; it is made of two cast iron pans with broad rims, one turned over the other and screwed together with a joint of paint and flannel, it should be about half-full of water when in use.

On the Utility of Horse Rakes, by Roberts Vaux, Esq.

Read August, 1816.



Birwood Lodge, 8mo. 8, 1816:

To Richard Peters, Esq. President, and the Members of the Philadelphia Society for Promoting Agriculture.

In one of my late letters to the President, I promised to furnish the society with some facts concerning the utility of the *horse rake*, now in general use by the farmers of this neighbourhood. This valuable implement is of such simple construction, that those who are the least expert with tools, might supply themselves with it. It is composed of a piece of scantling 3 by 3 inches, 10 feet long, into which 25 teeth 18 inches long, and 4 inches apart, are inserted horizontally ; 8 pins 4 inches in length are driven perpendicularly into the scantling, and there are also attached to it, two handles of similar

form as those of a plough.* The horse is connected by a chain to each end. The cost of materials to make a rake of this description, would not exceed two dollars, and I presume any carpenter, or wheelwright, could afford them complete, for four, or five dollars, each. Some farmers employ them for raking hay into winrow. But although it is an expeditious mode, the *hand-rake is more cleanly*. This instrument is most important in the grain field after the harvest is off. It not only combs the stubble, and gives the grass a much better opportunity to grow, but it saves an astonishing quantity of grain. The subjoined statements obtained from persons of respectability, who thus glean their fields, are sufficient to establish the reputation of the *horse-rake*, and ought to recommend it, to universal adoption.

Be assured of my respect.

ROBERTS VAUX.

* The Rake presented to the Society sometime since, and now in the room where it meets; if my memory is correct, was brought from Long-Island. It is inconveniently large, and clumsy. A rake of the dimensions I have given, is found by experience to answer the best purpose.

R. V.

Statement of gleaning, after the harvest of 1816, in the north-east part of the county of Philadelphia, accomplished by the use of horse-rakes.

	Acres.	Bushels.	Pecks.	
A. W. from	10	14		{ Part of this was raked twice.
J. S.	9	6		
J. L.	7	8		
R. W.	7	10	3	
J. M.	4	3		less 2 quarts.
P. J.	9 to 10	12		
J. B.	13	11		
M. N.	16	17		
B. B.	6	7		
	82	88	3	

Account of the successful Cultivation of Wheat on the sea coast of Rhode Island, by Messrs. Greenes, communicated to Dr. Mease, by Dr. Joseph Comstock, of East Greenwich, Rhode Island.

Read Sep. 10, 1816.

“ As agricultural concerns, occupy some part of your attention, I lately took pains to make inquiries of my friend, Col. C. Greene (brother of the late Gen. G.) whose family I was attending, respecting his extraordinary success in raising wheat. It is probably known to you, that of late years attempts to raise wheat in New England (upon the sea coast more especially) have been frustrated either by the wheat being killed by the winter, or by being ruined by blast. The Messrs. Greenes who own the Potowom farm in Warwick, the last year raised fifty-four bushels of excellent wheat off two and a half acres of land ; and that was the fourth year that the same spot had been under tillage, viz. 1st. Indian corn, 2d. Barley, and then two crops of wheat in succession. Last year a bushel of the wheat weighed 61 lb. There is now a promising crop upon the same spot.

The mode of culture has been: 1st. to manure the land highly with manure obtained from Naraganset Bay, to which their farm is contiguous; 2d. in the beginning of winter, after the ground is frozen, the same kind of manure (chiefly, almost wholly ell-grass) which is carted on in carts having broad wheels in such quantities as

to cover up the grain, and protect it from the severity of the cold. About twenty tons have been carried on for this purpose. In the spring the tender blades start through this covering. Lastly, in the month of June, the heavy dews are swept off early in the morning by two men taking hold of the ends of a long rope and passing it over the top of the grain. The blast is thus prevented from attacking it.

P. S. In parts of the country remote from the sea, there cannot be a doubt of any kind of litter answering the same purpose as sea weed to cover up wheat, and thus prevent it from being winter-killed: such as the straw of wheat, barley, rye, or the leaves of trees. The wheat raised by Messrs. Greenes, was of the beard-
ed species.

Account of the means to prevent the must and mildew of wheat, adopted with success in Flanders, by J. Meuse, M. D.

Read September, 1816.

Mr. Caleb Kirk of Brandywine, Delaware, lately brought me a few ounces of smut taken off of a parcel of wheat, by the operation of his mill used to prepare pearl barley; and informed me that twelve bushels of grain yielded three bushels of smut; and as this serious disease of wheat almost always appears under certain circumstances attending growth, and the seed used, I am happy in having it in my power to inform the American farmer of a safe, simple, and cheap remedy, and of course accessible to all, which has been for a long time in use in Flanders.

I obtained the knowledge of this invaluable remedy by reading a late pamphlet by that eminent and faithful friend and patron of agriculture, the right honourable Sir John Sinclair, which was recently presented to our Society with several other valuable works, by a generous friend to our Society living in Edinburgh.

It appears that Sir John Sinclair left London in the month of February, 1815, with the view of ascertaining what he might have easily found out without leaving home, viz. the relative prices of grain in Great Britain, and in Flanders, the causes of any difference that might exist, and the means by which any material variation might in future be prevented; but the extensive military

operations that shortly after took place in the country which was the immediate object of his researches, oblige him to confine his whole attention to Flemish agriculture; and I apprehend that every farmer who raises grain will be grateful for the important discovery which has been brought into notice of the world at large through his agency.

Smut is almost the only malady in wheat, known in the neighbourhood of Ostend: at Bruges it prevails more in oats and rye than in wheat.

The Flemish farmers, very philosophically ascribe the diseases of wheat, and the mildew in particular, to a successive degeneracy in the organs of vegetation in the plants sown; and they maintain that such maladies can in a great measure be prevented, first by sowing the ripest and best grain for seed: second, by frequent change of seed, (in many cases every second year) though when the best seed of their own growth is used, and it is properly prepared, such a change in some districts is prolonged for eight or ten years. Thirdly, by the preparation of the seed.

The effect of these measures may be judged of when it is considered that in the celebrated *Pays de Waes*, situated between Ghent and Antwerp, and which is reckoned the best cultivated district in Flanders, or perhaps on the continent, the *Nielle* or mildew is unknown, although the fields are small, and usually inclosed by trees and hedges (of course not well ventilated) the fields surrounded with ditches filled with water, and the wheat cultivated there, being of the white sort which is peculiarly liable to mildew. The climate is also variable, and often very rainy in spring and in harvest.

The ancient steeples for wheat in the *Pays de Waes*

was verdigrise, (acetate of copper) reduced to powder, in the proportion of about half a pound of English verdigrise to every six bushels of wheat, which was mixed with as much human urine as would enable the light grain, to swim, that they might be skimmed off. The seed is kept three hours in this liquid ; then dried with or without lime, and sown.

At Ghent, an apothecary, and his predecessors have for above fifty years, prepared and sold a remedy against the mildew, of which arsenic was the basis, and Mr. Prevost, having found by various experiments that blue vitriol (sulphate of copper) was also a preventive, the arsenic has been abandoned. The following is the mode of preparing the grain by this last process. Dissolve three ounces and two drams of sulphate of copper, in three gallons and three quarts, (wine measure) of cold water, for every three bushels of grain that is to be prepared. Into another vessel, capable of containing from fifty-three to seventy-nine wine gallons, throw from three to four Winchester bushels of wheat into which the prepared liquid is poured, until it rises five or six inches above the corn. Stir it thoroughly, and carefully remove all that swims. After it has remained half an hour in the preparation, throw the wheat into a basket that will allow the water to escape, but not the grain. It ought then to be immediately washed in rain water or pure water, which will prevent any risque of its injuring the grain, and then the seed dried, before it is sown. It may be preserved in this shape for months. It appears by a quotation of Sir John Sinclair from the Agricultural survey of the county of Derbyshire, that copperas is used as a steep for wheat by a farmer of the name of Butler in that county.

That the mildew is either not in the soil, or if it is, that the application of copper preparations to the seed, prevents its injuring the plants, is proved by an experiment, detailed by Sir John Sinclair, where mildewed grain was sown in a field that had before produced mildewed wheat; and yet the crop raised from the mildewed seed, which had been subjected to the above preparation, was no in the least affected by that malady.

Mr. T. A. Knight of Herefordshire, to whom we are indebted for the elucidation of many interesting questions on the subject of vegetable physiology, is of opinion that the disease called mildew is taken up by the root, (every experiment to communicate it from infected straws to others proving abortive) and that all we see externally is its fructification. This corresponds with Mr. Prevost's opinion, that it is an intestine *parasitical plant*, and hence Sir John justly concludes, that the root coming from a seed fortified against infection by preparations of copper may resist the disorder, however much that root may afterwards be exposed to its influence.

In addition to the foregoing facts of the successful employment of steeps to prevent smut and mildew, I may add those related by Tull, the father of the drill husbandry, and more recently of Mr. Barton of Virginia,*

*Wheat brought from Red-Stone in Pennsylvania to Frederic. County, Virginia, to exchange for salt, was used as seed-wheat by Mr B; and was steeped in strong salt brine, and covered with sifted lime previously to sowing. His crop from that wheat escaped smut, while the crops of two of his neighbours, who sowed the same wheat without any previous preparation, suffered much from smut. Barton's Medical and Physical Journal, vol. iii. 2nd Suppl. p. 178.

in favour of steeping seed-wheat in salt : of Mr. Andrews in the 6th vol. of the *Agricultural Annals* of A. Young in favour of arsenic and a ley of wood ashes, and those of Mr. Jennings in the 9th vol. of the *Bath memoirs* in favour of diluted sulphuric acid, all of which shew the truth of the theory respecting the cause of smut, as given by Mr. Knight, and should induce every farmer to try them in case his situation is liable to either smut or mildew, or he is under the necessity of using grain any way infected with either disease.

With regard to the influence of the perfect maturity and good quality of the grain on the future crop, there can be no question. The same principle that operates with so much force in the animal creation, viz. the production of a healthy and vigorous offspring by healthy and vigorous parents, is every day perceived in the case of vegetables : and by an attention to it, our philosophical countryman, Joseph Cooper, has been enabled not only greatly to improve a variety of Indian corn, but to preserve that acquired excellence unimpaired for a series of years ; and it is to the diffusion of the knowledge of his practice, that a revolution in this respect may justly be attributed among our farmers, who either influenced by prejudice, or from being ignorant of the evil consequences of a contrary conduct, were in the habit of constantly selling the best of their various crops, and of reserving the most inferior for seed, and thus were under the necessity of renewing their stock of seeds by purchase from others, who were possessed of better than themselves. I can myself furnish additional testimony, were any necessary, in proof of the propriety of a change of seed. The farmer whose land joined mine in Delaware county, was

somewhat prejudiced on this subject, and like most of his neighbours neither took pains to change his seed wheat, nor even to select the best of his various grains to sow. Corn was corn, and wheat was wheat. He never read any book on farming. What he thought of my sending to Caroline county, Virginia, for my seed wheat, I know not, but as he laughed at my merinos, which were to eat all the roots of the clover out, he no doubt laughed at my late zeal in sending for wheat so far, when in his opinion, I had as good of my own raising. My seed wheat was immersed in water, all the light grains skimmed off, and the heavy grains, when drained were rolled in gypsum. My crops were fine; but my neighbours, particularly one year, was very much affected with smut. Upon inquiry of his son, who was my manager, as to the cause of the disease in his father's wheat, he candidly told me, that he had not changed his seed for eight years: and as to a steep, he never thought of any.

Account of an uncommonly fertile soil in Lancaster County, and on trimming hedges, by Caleb Kirk, of Delaware.

Read September 1816.

Brandywine, 8th 6mo. 1816.

Esteemed Friend,

I lately returned from a journey, in which I had occasion to pass though six counties, three of Maryland, and three of Pennsylvania, on which rout the bad appearance of the wheat crop had claimed my sympathy with the farmer, on seeing the unpromising prospect (I suppose from the Hessian fly and frosty spring.) But calling on a friend in the lower part of Lancaster county, and the conversation turning on the subject of the unfavourable prospect, he invited me to walk out and see his wheat field; I did so, and I was gratified with a prospect of at least thirty bushels to the acre, and as the contrast was so great from the last farm I had passed, which would not yield one bushel to the acre on a great part thereof, (some spots better,) and as my friend A. Slaymaker's crop looked so handsome, I was led to enquire as to his manuring, &c. He informed me that he had never put a load of manure on that part of his farm since his residence on it thirty-six years; neither had he ever missed a crop in that length of time, and had one year obtained 401 1-2 bushels off of ten acres and a half. I was induced, from his relation of the fact of its continued fertility, (having been settled

and cultivated about ninety years) to take some of the soil, though it has the same appearance as deep as it had ever been penetrated by digging, and forward it for inspection and analysis, as that must contain all that is the needful food for the most valuable vegetation. I did not inquire particularly how often he cropped by tillage, but from the adjoining ground being in mowing order with clover and timothy well mixed, which I thought might produce two tons to the acre; another in addition, corn, another pasture, &c. I suppose the accustomed mode of farming practised in Lancaster and Chester counties was adopted.

If the soil I have sent is wet as much as necessary for vegetation, it would give it the natural appearance.

My friend Slaymaker is entitled to the fullest confidence in respect to facts stated.

Very respectfully from

CALEB KIRK.

P. S. From the vigorous appearance of my thorn hedges this season I was induced to pursue my former practise of *trimming*, which I perform from the 15th to the 25th of the last month, and they assume an appearance so pleasing in their present dress, as to gain the approbation of all who visit them. My mind is fully settled on that subject now, and one of my neighbours is pursuing the same practice.

I treat the Virginia* and Delaware thorn† both in the same way, and they are alike healthy.

C. K.

Dr. JAMES MEASE.

* *Cratægus Cordata.*

† *Cratægus Crus-Galli.*

On the Utility of Planting Hops near Grape Vines, in preventing the destruction of the Grapes by insects, by James Mease, M. D.

Read September, 1816.

It is well known to most of those who have attempted the cultivation of foreign grapes in the country, that they do not succeed owing to the influence of mildew, rapid variation in the temperature, and punctures made in the fruit by insects particularly the black wasp: while on the contrary, that they succeed very well in Philadelphia where they are more sheltered, where the influence of the sensible qualities of the air is less felt, and the insects fewer than in the country. The operation of some of the causes mentioned is beyond our controul, but for one of them, viz. insects, a remedy it is believed is within our reach, and that is to *plant a hop-vine* at the *side of the grape-vine*. For this discovery we are indebted to C. Redman, Esq. of New Windsor, Bucks county, opposite Bordenton, on the Delaware; who made it in the following accidental way. Having a grape-vine, the fruit of which had been annually destroyed by insects, and wishing to have shade near the vine, he planted a hop-vine at the root of the grape-vine; the consequence has been, that it has borne fruit for the two last years: the bitterness of the hop plant, and the effluvium emitted from it, probably prevented the insects from approaching or feeding on the grape-vine entwined by the hop plant. A lady to whom Mr. Redman mentioned the fact of the utility of the hop in preventing the grape from insects, told him that

she had a grape-vine that grew near a hop-vine, which bore abundantly while the fruit of others planted more remote from it was annually destroyed by insects. From these facts we may, I think conclude that the hop-vine affords at least a probable remedy against grape insects, and as hops are an indispensable article on all farms, and the surplus produce always commands a ready sale, there can be no objection to their being constantly planted near a grape-vine.

To Richard Peters, Esq. President, William Tilghman, Esq. Vice President, and the Members of the Philadelphia Society for promoting agriculture.

Gentlemen,

One of the first and most desirable objects of inquiry which called my attention on my retiring to the country some years ago, was, how shall the scarcity of timber for building, fencing and fuel in the vicinity of our city be most effectually remedied for the present generation, and prevented in future: the present prices being four fold more than they were within my recollection of them. For fuel, we must look to our coal mines ere long, or contrive some mode of warming our houses in the country with a less quantity of wood, than any mode in present use, with which I am acquainted will perform. I have under experiment locusts (*Robinia pseudo-Accia*) for Posts; Chesnuts (native and Sicilian or Spanish) for posts and rails; button wood (*Platanus occidentalis*) and common black cherry, both good for fuel and of very quick growth; of which I may perhaps at some future, not distant day, address the result to this respectable society; but casualty has furnished me with the knowledge of a tree which seems to promise much usefulness. Among the ornamental trees which I selected for clumps of shade near my dwelling house, were two suckers of the *morus papyrifera* from Clermont, then the seat of Thomas Buckley, Esq. now of Jacob Ridgway Esq. I think in 1808. These were planted in the

W.S.W. front of my house; they grew with rapidity and in the second and third years threw up a number of suckers at considerable distances in every direction around them; of these I transplanted three or four to the Right hand of my N.N.W. front, which grew with equal rapidity, and at the end of a year or two, put forth many suckers from roots widely extended, just under the surface of the ground. Those first planted in the W.S.W. front continued so to infest my grounds intended for grass walks, by immoderate numbers of suckers that in the year 1813, I rooted up the parent stocks (which I now have as seasoned posts upwards of ten feet long) and all the suckers issuing therefrom, which I planted sparsim in my woodlands with the hope of their forming clumps around them, to prove of value in some way or other. The three suckers planted on the left of my house in the N.N.W. front, became equally prolific in suckers. I ordered my gardener about a month ago, to uproot them, and all their progeny, and to transplant the suckers into vacant spots sparsim in my woodlands, which has been done, and I have now three large posts upwards of 10 feet long, perfectly fresh and green. From one of them I have had cut the upper part, leaving a post of nine feet, and had two quarters split and planed, at one end obliquely, to shew the surprising growth of the wood; and below this at 9 feet from the ground a cylindric segment of the wood measuring between 5 and 6 inches in diameter, and cut and planed obliquely on the upper part, to shew that the tree has had but six years growth: I send therewith the two described pieces as samples of the wood. Should it prove valuable as a firm and durable substance, whereof to manufacture useful wares, as

from its curved branches it may be, for the ribs of boats or large vessels; or its leaves for food of silk worms: or if it will serve no other purpose than for fuel, the amazing quickness of its growth will render it a most valuable acquisition to farmers and others in those parts, where the native woods have become scarce and artificial plantations are beginning to be necessary. I shall immediately commence a trial of their duration in the ground and weather, by planting both the green and dry stocks which I have, as posts, in the earth, to prove their duration, and should I live to verify the expected usefulness I shall not suffer my experiments to remain unnoticed. I have also a few faggots of the upper growth which I shall reserve, to make experiments of their quality as fuel, and communicate the result to your notice should it prove worthy of your attention.

I am very respectfully your friend
and fellow labourer in the
object of our pursuits,
MIERS FISHER.

Ury, in the County of Philadelphia,
4th mo. 30th, 1816.

Corn Grubs, or Cut Worms. Fall-Ploughing.

Belmont, August 8th, 1815.

This season has been remarkably unpropitious to our crops of Indian corn; which, however, are far better than we could have expected; and will on the whole, be tolerably plentiful, (although, in many parts of our country, they have been greatly injured,) if we should be favoured with a mild autumn. The ravages of the grub, or cut-worm, have been uncommonly ruinous. The prevention of this scourge, so often deplored, and so seldom guarded against, is always in the power of every provident farmer, and, if he will not prevent, he ought not to complain of, the injuries to which the corn crops are subject. The preventive is *fall-ploughing*; which exposes the progeny of the grub to destruction, by frosts, and other inclemencies of the winter. During a period of more than fifty years, I have been personally engaged, or constantly interested, in practical farming; and I can truly say, that I never suffered any material injury from the grubs; when I turned up my fields intended for corn, in the fall of the year I generally harrowed the fallow: and, previously thereto, often rolled down the sod. When I could procure lime at that season, or early in the spring, I was, and am still, in the habit of spreading it on the corn fallow; and although this is a destroyer of the nascent

grub; yet the effect was manifest, without the application of lime. If fall-ploughing yielded no other benefits, (and numerous are its advantages,) one would imagine, that this would be sufficient to recommend it to general adoption. Yet, although the practice has been, of late years more commendably attended to than formerly; it is really deplorable, that it is not more universally followed. Merely ploughing is salutary; but the harrowing, and thereby completely separating the clod; and breaking up, or exposing to the influence of frosts, the depositories of vermin, is equally essential. Besides, the sod being thus separated, and access of air prevented, by harrowing, (and if previously rolled, the better,) the weeds and grass do not, in any great degree, vegetate in the spring. If undisturbed, and they may so remain if the seed be shallow planted, these pests become decayed, or rotted; and assist, instead of impeding, the growth of the crop.

I have made extensive inquiries this season; and I have found, almost universally, that those who fall-ploughed judiciously and in due time, escaped the grub. In some instances where the field was only partially ploughed, or the work ill managed, the grub was more or less injurious; and I considered these as exceptions to the general fact, without shaking the general principles of the practice. In some fields, only partially fall ploughed, the superior vigour of the corn, is strikingly perceptible.

Ploughing, or backing up, a few furrows in the spring; and leaving balks for the worms to feed on, may have partial advantages; but this is a miserable substitute for fall-ploughing; and is a disgusting proof of

negligent and slovenly farming, although it may sometimes succeed.

I am your very obedient servant,

RICHARD PETERS.

ROBERTS VAUX,

Sec. to the Philad. Soc. for

Promoting Agriculture.

NOTE.

Read February, 1817.

The means by which fall-ploughing accomplishes the destruction of the grub, are not of so much consequence as the fact of that operation producing the effect. And that, in the greatest number of instances, it so does, and spring-ploughing does not, has very many respectable authorities to prove. One will be seen in this volume, communicated by Mr. *Adlum*; which places the matter beyond a doubt. There may be some apparent exceptions, which if carefully examined into, would not have weight sufficient to oppose the general current of facts.

Whether the plough reaches the recesses of the depositories of these vermin, or exposes the sod to dry and perish, so as not to afford food for their progeny when in their infant state, is a matter of more curiosity than real use. It would not seem that they lie too deep for the operation of the plough, either directly or consequentially. Holes pierced into the corn hills, 6 or 8 inches deep, by a dibble or pointed stick, are traps into which if the grubs, when in their most powerful stage of growth, fall, they are incapable of ascending; and thousands thus perish. It is most probable that, at the time of fall-ploughing, they are sufficiently within reach of ex-

posure to the subsequent inclemencies of the winter. It would be well to collect facts; so that the history of this destructive foe to our corn plants may be fully known; and such facts are infinitely more useful and valuable than theories. A highly useful fact is often lost sight of, in controversies about causes; such discussions not being always carried on with candour or temper. The consequences of disputes on agricultural questions, are not a little injurious to the interests of the art; by deterring many who are apprehensive of critical remarks, from publicly communicating their thoughts or experience. There has been more fall and winter ploughing, during the past autumn and present winter, than I recollect heretofore to have occurred in any one year. Therefore facts can hereafter readily be collected on the subject; especially as they relate to the cut-worm, and the means of preventing its ravages. If the balance of facts be favourable, although the practice, like all human endeavours, may not always be equally successful, there is sufficient encouragement to pursue this operation; which, independently of its effect, generally, on the cut-worm, has sufficient advantages to recommend it. I never observed the white grub, (the offspring of the cockchaffer,) to injure materially, if at all, the young corn plants. The beetle producing them, I believe, deposits its eggs deep: and the white grubs generally delight to remain subterraneously. Being furnished with a shelly head, and more powerful means of feeding on coarser food, they seldom appear superficially, at the time the corn plant is young and tender. My *potatoes* have often suffered by these grubs; which bury themselves in, and feed on, the bulb. This is one of the disadvantages of sod planting; which, nevertheless, I think a good practice. Among my potato crop, (on fall-ploughed ground,) grew a number of fine plants of Indian corn; which were not in the least annoyed, either by the white grub, or the cut worm; yet the corn on my tenant's field, spring-ploughed, divided from mine only by a fence, was so injured by the cut-worm, that it had been replanted twice or thrice. My ground had been ploughed in the autumn 8 or 9 inches deep, and treated in the manner usual with me. The sod was left to decay, unturned by the plough, until I gathered a very plentiful crop of potatoes; and then white grubs were found, in great numbers, among the

remnants of the sod which was, in a great proportion, rotted; and all of it so decayed as to be incapable of vegetation.

Many replant Indian corn unnecessarily. If the plant be cut off only above the surface, it will, nevertheless grow vigorously. The yellow corn is infinitely better this season, than the gourd-seed; which has been the most affected by the misfortunes occurring to our crops. The unripe corn, of every description, has been found neither nutritive nor salutary to any kind of our domestic animals.

As to the rotting or decaying, and extinguishing all power of vegetation, in the sod treated in the manner I have often described; leaving the soil filled with dead and inert vegetable matter, to be operated on by lime, plaster, and such substances; I have had, among many preceding proofs, a strong instance, this last season. It was viewed and approved by many persons, and its cleanliness and freedom from all noxious vegetation of grass or weeds, much noticed. I never meant to say that the mere operation of fall-ploughing, would complete the process required. The field must be kept clean, through the succeeding season, by being superficially stirred with hoe and common harrows, in preference to the plough; as I have noticed in our II. Vol. Without this, I am well aware; that grass and weeds will grow, in a greater or less degree; but much less after fall, than spring ploughing; if the fall-fallow be treated in the manner I have mentioned: although I know, that many, judging from local qualities of soil, or imperfect essays, hold a contrary opinion. If the sod be not turned by the plough, its tenacity will be destroyed by the fermentation or decay of the vegetable matter and this I call decomposition; though it may not amount to intire putrefaction. To aid and promote this, I cut my sod of last season, in the spring, with the coulters, and dressed the surface with the hoes of that excellent implement described (III. Vol. of our Memoirs) by general Steele; who was so obliging us to procure one to be made for me. *He* prefers spring ploughing, for cleaning his fallow; and as *I* do not, I presume the soils I have long cultivated differ in their qualities and texture, from those he tills. But if his experience in this regard, were more generally acquiesced in; the advantages of fall-ploughing in preventing injuries by the grub, would give to it a decided preference.

R. P.

February 6th, 1817.

When I communicated the foregoing on *Fall-ploughing*, &c. and the note I wished to follow it; I was persuaded that the *corn-grub* was the progeny of the *dung-beetle*. Great numbers of grubs having been found in the holes made by this beetle, confirmed an idea suggested by other circumstances. But since I have observed the fact, that holes made with a stick, will also be filled with grubs falling into them, and have been satisfied by proofs of grubs turning into *moths*, I have retracted my former opinion. Next to the pleasure of establishing a truth, is that of acknowledging an error. But this discovery of the parent of the grub, is highly favourable to the uses of fall-ploughing; as moths must lay their eggs shallow, and more exposed. It also accounts for the efficacy of previously burning the dead grass, weeds, &c. composing the foul cover of fields ploughed in the spring, for Indian corn. It seems probable that the moths deposit their eggs or young on this foul cover.

I have threshed my crop of wheat and rye off the field sod-rotted. Of wheat (heavy and perfectly clean) I have 30 bushels to the acre; of rye, 36 bushels. I cut, with my stubble, two tons of clover and orchard grass to the acre, in the last autumn. Not a weed to be seen.

R. P.

February 26th, 1818.

Effects of Season on Crops.

Read March 11th, 1817.

Sir,

In the Argus of western America bearing date the 10th January, 1817; I saw a resolution of the Philadelphia Society for Promoting Agriculture, wherein they requested their Agricultural or other fellow-citizens to afford such information as would tend to promote Agriculture. Whether that request extended as far as Cumberland or not, I cannot tell; but when I first saw it I resolved to communicate to you, such information as I thought would be of benefit, and at the same time, think perhaps the correspondence would likewise be of benefit to me. I am not a farmer. But such information as I can collect I will give unto thee. Mr. William Smyth informed me not long since, that the red clover in his meadow had during last year nearly destroyed the timothy, evidently on account of that grass being more prevalent in that extraordinary season than the timothy. Another gentleman informed me that the frost in the spring so completely killed the apple, that the consequence was a total failure of the fruit, but to his surprise, in the month of August, the trees blossomed and brought forth fruit, which grew to the size of hen's eggs, and was

of course destroyed by the frost in autumn before they could arrive at perfection, some of the apples I tasted myself, and they had all the qualities of a common green apple. This circumstance I never saw before. The same gentleman likewise told me that neither the weevil, the fly, nor rust (or rather blast) have injured wheat within his knowledge in 1816. Whereas it had not failed injuring more or less since his residence in Kentucky; owing as I conjecture, to the coolness of the spring and summer. This accords with reason, for in colder climates the wheat produces more, and clearer of blast or weevil than it does in this country.

This is only a short sketch which perhaps will not be very entertaining, but in a few weeks I shall have more leisure from the throng of business, when I shall strive to gain such information concerning Agriculture as our country will afford, which shall be duly sent on.

T. SEMPLE.

S. W. CONRAD.

January 20th, 1817.

On the Effects of the Season on Crops : on Fall Ploughing, and Lime-shells as a Manure, by John Aldum, Esq.

Read Feb. 11th, 1817.

*The Cottage near George Town,
D. C. Jan. 21st, 1817.*

Dear Sir,

The last season, I think, was the most extraordinary I ever witnessed, and although I did not actually see the frost on the cold mornings; I observed after the sun appeared sometime, the sweet potato-vines, with the melon, cucumber and lima beans, appeared in a degree scorched. The leaves were not quite killed, but had a white or bleached appearance, and they were most injured where most sheltered from the wind and current of air. The weather was so cold that the corn continued much longer than usual in its roasting-ear state; a few hills that I planted in my garden, the seed of which came from the West-Indies, were about six weeks in their roasting-ear state before the frost killed it.

The Indian corn generally in this neighbourhood was bad and nearly in the same state above-mentioned; for very little more than half of it ripened. I did not pull my field corn until sometime in December, near the half

of which was soft, and that which was hard and fit to grind, was shrivelled, and did not appear as if come to maturity. In the year 1815, my water melons ripened in 82 days from the time the seed was put in the ground, and I thought from the badness of the season (for here it was not a good one,) that they were several days later than usual in ripening. In 1816, my water-melons were 102 days from the time they were planted until the first one ripened : musk-melons were 111 days from the time of planting, before I had a ripe one ; which made a difference of 20 days in the time of the water-melons, and 24 days difference in the others. And I believe that almost every thing else except, *wheat and rye*, was in the same proportion of time coming to maturity : the oat harvest was at least three weeks later than in other years, neither did the hickory or walnuts come to their usual maturity, for I have not seen any with a perfect kernel ; they generally shrunk and in a degree withered.

I saw an extraordinary exemplification of the advantage of fall-ploughing, last summer about two miles from me.

There are two fields which were originally one tract of land, and the publick road now divides them, I know of no difference in the soil ; they are both level and opposite to each other. They were originally timbered with black oak, upland hickory, with some gum, persimon, dogwood, &c. and the stone, white flint ; both fields had been in clover about the same time ; but the blue grass was taking possession of them. Dr. Grayson who owns one of the fields, had it ploughed up in the autumn of 1815 ; Mr. Bell the owner of the other field, ploughed his the spring

following. They were both planted with Indian corn, about the same time. I rode past those fields four or five times a week all summer, as they were between my two places; and I do not recollect seeing any of the corn in Doctor Grayson's field replanted; I inquired of his overseer, who informed me that there were very few of the corn hills cut off by the cut-worm; whilst in Mr. Belt's field, I observed them frequently replanting the corn; I made it my business to inquire of Mr. Belt, owner of the spring-ploughed field, and he informed me that his field was replanted four times; which I have no doubt of, from what I saw in the course of the last summer. I frequently questioned the negroes who worked in the field, as to the cause of their replanting the corn; and they uniformly informed me, that it was cut off by the cut worm. And they further said, that they did not think that there were one thousand hills in the field that were not cut off twice or three times. Mr. Belt himself informed me, that he did not get one barrel (which is five bushels) of sound corn off the whole field, which was about eighteen or twenty acres. It was cut off in the silk, for fodder. Dr. Grayson's field was about fifteen acres; and as good corn as any in the neighbourhood.

I had almost forgot the specimens of pyritous earth you sent with the other things. I have seen but one place in this neighbourhood with such earth, which is mixed with iron; some of it that I heated red hot, had a smell somewhat like burnt feathers, from which circumstance, I suppose there must originally have been some animal matter mixed with it. I have observed in places where they

have dug the roads through the hills near George Town, veins of a greasy looking substance, which I think contains a portion of sulphur, but when heated red hot, it also smelt like burnt feathers, and where wells are dug near George Town, I have observed considerable quantities of a sulphureous earth thrown out, and the water of some of them much impregnated with it (*i. e.* sulphur). Will not sulphureous earth operate as a manure, probably like plaster of Paris? If I am spared, I intend to try it this year.

Quere. Will not oyster shells burnt into lime, operate more powerfully on land, than when simply pounded, and will they not go further? Probably they will not last so long. I tryed burnt oyster shells, when I lived near Havre de Grace, about one hundred and sixty bushels per acre, on a clay soil with but little effect. But between three and four hundred bushels to the acre, had a very surprising effect upon a more loamy part of the field; the orchard grass on that part was always as high as the post and rail fence, grew and continued while I lived on the land which was seven or eight years after. Putting this quantity on the ground was accidental, for having left home for a few days, I set my black people to burn the shells, probably about six or seven hundred bushels, which I intended for between four and five acres but my people to save trouble, put them all on about two acres. The mode I practised was to run furrows sixteen and a half feet apart, and to measure out of the cart one bushel of the oyster shell lime about the same distance apart between the furrows, which was a labour my people were averse to, and therefore took the

liberty of spreading it this last time, before my return home, on about two acres.*

I am dear Sir, very
sincerely yours, &c.

JOHN ADLUM.

THE HON. RICHARD PETERS.

POSTSCRIPT.

As I observed a communication from my old friend. T. Matlack, Esq. in the III. Vol. of the Philad. Agric. Memoirs, on the cultivation of the vine, I wrote him enclosing two letters from Mr. Jefferson to me, to shew him that there was another grape, that he had not mentioned, which I thought deserved some attention. When I described the grape to Mr. Bartram near Philadelphia, he informed me that it was found by governor Penn's gardner somewhere near Schuylkill and was called the Alexander grape. In Mr. Matlack's reply to me he says. " You have proved that the Alexander-grape, is invaluable.

* I have many times in my life, used oyster shells calcined, and powdered raw, or unburnt. I have always believed the shell lime to be three or four times weaker than our common stone lime. The operation is more immediate, as is the case with all *mild* lime; but its duration is much shorter. For top dressing, the powdered oyster shells are excellent. But 40 or 50 bushels of the powder, are required for a complete dressing.

That all earths impregnated with sulphur, are manures, is an old opinion of mine; supported by experience, and the concurrence of respectable men.

R. PETERS.

“able to our country; but that it is a fox grape is much doubted: a white woolly appearance on the under side of the leaf, is said to be the characteristic mark, of what is properly called the fox-grape; and the Alexander-grape* is, here, supposed not to have that mark.” The grape that I made the wine of that I sent to Mr. Jefferson, is the size of a small fox-grape, it has also that peculiar taste, the fox-grapes generally have, but not in so great a degree. It has also the pulp which is so elastic that the grapes cannot be pressed, until the pulp is dissolved by fermentation. The grapes are very rich and sweet, and the peculiar taste leaves the wine, in nine or ten months after being made. The under sides of the leaves have a yellowish white and woolly appearance; so that probably it may not be the Alexander-grape, but I have no doubt of its being a native.

I got the cuttings in Philadelphia, from an old German, who informed me he was employed by the citizens to prune their vines.

J. A.

* *James Alexander* was a worthy, intelligent man, gardener to the proprietary, Thomas Penn, at Springettsbury; well known to me. It was a favourite object with William Penn and his successors, to establish vineyards; and every effort was made by them to cultivate the vine. But no success attended the endeavours. Every attempt at any extensive culture of the grape, has failed in this part of our country. In our cities and towns some good grapes are found; but in the country no success crowns the most persevering endeavours. It is therefore best to apply our labour and means to agricultural objects; in which we can assure ourselves of success. In some parts of our union, no doubt the grape may thrive. But *here*, the plough is the implement which demands our unremitting attention.

It would seem, that, to ensure better fortune to the cultivators of the grape, they should select the best native kinds ; whereof there are great varieties ; and many little, if at all, known. I bury my grape-vines and figs, in the autumn ; to guard against severe winters. I lost fifty foreign grape-vines in one winter, by omission of this precaution. General *Moreau* told me, *he* found it necessary in this country. He informed me, that the inhabitants of a large village near *Paris*, who supplied the market with great quantities of *figs*, formed their trees so that the branches were calculated to admit of their being covered with earth, to guard them against frosts even in that climate.

R. P.

On Hotchkiss's Straw-Cutter, by R. Peters, Esq.

Read February, 11th, 1817.

Belmont, 8th April, 1817.

Dear Sir,

I enclose a letter from Mr. I. C. Jones, to be read to the Society. I sent to the press (Poulson) the publication he alludes to, and it has had an extensive effect; for many now chaff their hay, straw, and corn-fodder. Hotchkiss's straw-cutter was introduced here, at my suggestion, by the unremitting exertion of my son Richard; who had many teasing embarrassments, before he could obtain the establishment for the agents of the patentee. It is getting into great credit; and when it is further improved, I am satisfied it will become generally used. I perceive in the public prints, that in N. England, they have added a fly-wheel of longer diameter. I told the agents that this was much wanted, as well to remedy, in this or some other way, its defect in the slow and irregular protrusion of the hay, or straw, for the operation of the knife, as for encreasing its number of strokes. I find a wonderful saving of provender, by chaffing it. But my servants have been reluctant and incredulous. They mend a little, and I see the advantages of their amelioration. I account for the utility of chaffing, by its exposing more

points for the extraction of nutriment, to the maceration of the liquids in, and the action of, the stomach, or stomachs, of animals. And no provender, is wasted, as it is by feeding entire; either by negligence in servants, or uselessly passing through the viscera. I have strong hopes, that the practice of chaffing, will be a great relief in this season of comparative scarcity. We are so much accustomed to abundance; that we have never studied or practised the economy, which necessity enforces. Three bushels of my chaffed hay, weigh a stone, fourteen pounds, and this is enough for a horse; with a common allowance of oats or chopped grain, for twenty-four hours. Very little more will be sufficient for a horse standing idle, without other feed. Mr. Jones saves more than the wages of a man, in a year, viz: more than seven tons of hay, in the keep of his four horses; for I allow five-hundred pounds of hay, including waste, to keep a horse for a month. In the common and careless manner of feeding, this quantity will not do it. So that, in an extensive concern, a farmer would be well paid, by keeping a hand exclusively for chaffing his long provender. And yet I believe, that on common farms, his time would not be half occupied, in this employment. A man and a boy can cut, with Hotchkiss's cutter, in forty or fifty minutes, as much hay, and more straw, as will serve six horses, and fourteen or fifteen cows for the day and night. This has been proved, by actual experiment. other cutters may, as Mr. Jones affirms, do more in the same time, (and I do not know that they can) but the labourer, at others, is exhausted to prostration, whilst one at Hotchkiss's does his work with ease. This has been tried. But one to feed, and one to turn the winch, will do the

work more expeditiously and profitably. I have two boxes, holding forty bushels of chaffed hay, or straw. By this means I can tell the quantity used in a given time; and they are replenished as often as they are emptied. At idle times, bad weather, &c. farmers might always chaff a quantity before hand. If, in cities and towns, men would devote themselves to chaffing hay, by the ton, (as wood sawyers work by the cord,) the saving in a large city, would amount to more, than I have either time or data to calculate. In the country, the advantages are not to be counted. More stock could be kept on dry forage, and more cattle fed, or more hay sold, or more ground turned to other uses than those of hay or pasture, if the saving by chaffing provender, were generally practiced. Even corn stalks, cut in thin pieces, so that the nutriment can be soaked out in the stomach, are highly nourishing, &c. ; and when used before they are injured by standing out too long, are palatable and agreeable to cattle. In the southern states, their cutting their corn-tops and blades, and even stalks, (and they have spare hands enough to do it,) would turn to great account.

Yours very truly,

RICHARD PETERS.

ROBERT VAUX, Esq.

Sec. Philad. Soc. for promoting Agriculture.

POSTSCRIPT.

My neighbour, R. Rundle, Esq. set a smart labourer at a good common cutter; and a gentleman not accustomed to labour worked the larger Hotchkiss's cutter. Bundles of Rye straw of equal size and weight were put in the boxes, respectively. The gentleman finished his with ease in four minutes, and the labourer (hard run) took five minutes in doing his work.

On Straw Cutting, and Mangel Wurtzel.

Read February 1817.

Philadelphia, 2d Mo. (Feb.) 3d, 1817.

Respected Friend,

Thy address under date of the 23d ultimo was received the 24th, and should have been acknowledged ere this, had it not been for the press of various engagements, which have occasioned the delay until this time. The information was correct, relative to my having one of Hotchkiss's straw and hay cutters (being one of the least of the two sizes exhibited for sale) and when I first got it, I felt much pleased; being impressed with the idea, that it possessed considerable advantages over our old fashioned kind, in which the knife is moved with the hand, both with respect to the rapidity of cutting, as well as to the regularity in the length of the chaff. But I have since found, on testing the two kinds, that Hotchkiss's, in point of expedition in chaffing, is inferior, but in point of regularity in cutting, superior. The information requested on the subjects of my success in raising the Mangel Wurtzel, or Scarcity Root, and which is also sometimes termed the Beet root, as also the advantages I have derived from feeding with cut hay and straw, in preference to feeding those articles entire; so far as my small degree of experience extends, in relation to those subjects, I will communicate with pleasure.

My attention to feeding my horses (four in number) with cut hay, by measure, commenced in the fall of last

year. in consequence of a publication I saw in one of our city newspapers (being, I think, an address to the Bath and West of England Agricultural Society,) in which were detailed great advantages, that had been derived, by adopting that practice. Experimenting on that mode of distributing hay to the number of horses above-mentioned, I found, or as nearly so as I could calculate, a saving of thirteen hundred pounds per month. I have since extended the practice to the whole of my farm stock of cattle, and believe the saving to be, in the same ratio as stated relative to the horses. In addition to this saving, may be added, the advantage of an intermixture of cut corn-stalks and some other descriptions of food, that would not be eaten separately, and without being thus chaffed. My horses and cattle are all healthy and look well.

The reasons thou hast assigned, in favour of the use and advantages of chaff cutting, are those which have occurred to me as being the most probable. In addition to these, I think may be added another, *viz.* the great saving, in point of the waste experienced in the usual mode of feeding provender entire out of racks. As respects my success in the culture of the Scarcity root, Mangel Wurtzel, or as it is sometimes called, the improved Beet root, it must be confined to an experiment of the last season only, not having turned my attention *practically* to agricultural pursuits for upwards of twenty years previously. I was induced to make the experiment, from reading the accounts of some extraordinary results, in the culture of that plant in England.

In the 4 mo. (April) of the last year, I had a piece of ground containing thirty-one and three quarter square poles, prepared for the purpose of planting my seed of the

Mangel Wurtzel. They were planted in parallel rows of two feet three to four inches one way, by one foot the other. On gathering in my crop of roots in the 11th mo. (November) last ; I found the result, in point of weight, to be eight thousand one hundred and eighty pounds ; and that the weight of leaves pulled from those roots at different times through the season, amounted to five thousand five hundred and ninety-five pounds. I am of the opinion they would have amounted to considerably more ; but in consequence of the dryness of the season, a suspension of pulling the leaves took place for some weeks. Although this result is below those that we have accounts of, as being realized in Great Britain, yet it is sufficiently great to induce me to make a further trial, (should no unforeseen event turn up to prevent) on a much more extensive scale, the next ensuing season.

I have a very high opinion of this plant for farm stock, particularly milch cows, not only as respects the leaves for green food during the summer season ; but more particularly so, the cut or chopped root, during that part of the year in which we are obliged to have recourse to dry food. They are also an excellent esculent for the table ; my family generally prefer them to the red or garden beet. I also raised the last season, on twenty-three square poles of ground, one hundred and ten bushels of the long orange root carrot ; being at the rate of nearly eight hundred bushels to the acre. On weighing a bushel of those carrots, (cut with an instrument in the form of an S, which enables a man to cut with remarkable expedition.) I found the weight to be forty-seven pounds, and the weight of the same quantity of the improved Beet root, managed in like manner, I found to be fifty-five pounds. This

giving the data for calculation, I discovered that the total amount of beets raised on the thirty-one and three quarter square poles of ground, as above specified, would be equivalent to the rate of about nine hundred bushels of carrots per acre. In addition to this superiority of the beet, which respects the quantum of the roots of the two plants only, is to be taken into the account, the value of the beet leaves, as also the culture of the latter, which, in the way I planted them, requires less manual labour; the vacancy between the rows being sufficiently great for the admission of a plough with one horse; whereas the carrots, after they are above ground, require the use of the hoe and hand weeding altogether. I have therefore concluded to turn my attention more particularly to the culture of the beet, in preference to the carrot.

Thou observes it would be gratifying to have my permission to lay the details and results of my practical experience before the Agricultural Society. I have only to remark, that if any of the above is considered of sufficient interest to claim the attention of that highly respectable body, I shall not object.

Thine with sentiments

Of much respect and esteem,

ISAAC C. JONES.

RICHARD PETERS,

President Philad. Agric. Soc.

NOTE.—My ideas of the uses of *chaffing* were founded on the process of nature, in preparing the food in the stomach, for entering the

system. This preparation is mainly performed by *maceration*, or soaking, in the liquids found floating in the stomach ; the most powerful of which is the *gastric juice*. The more points of the food are exposed to the action of these fluids, the more nutriment is extracted. *Chaffing* has the effect of a double mastication, and exposes every particle of the food to the action of the juices. Whereas long hay, or other provender, swallowed, as it commonly is, hastily and not sufficiently chewed, is only operated on partially ; and a great proportion passes through the intestines with the nutriment unextracted, wastefully and uselessly. *Cattle* and other ruminant (cud-chewing) animals have more stomachs than the *horse* ; which has only one. Of consequence the macerations are repeated ; and they will thrive on coarser food than that proper for a horse. Yet for them, chaffing is essentially useful.

R. PETERS.

*Isaac C. Jones' Communication to Richard Peters,
President of the Philadelphia Agricultural Society.*

Read March 11, 1817.

Philadelphia 3d mo. March 1st, 1817.

Respected Friend,

In my letter of the 17th ultimo in answer to thine of the 8th, I stated the quantity of chaffed hay I was in the practice of giving to a horse or a cow; viz. two bushels to each in the 24 hours; amounting to from 15 to 15½ pounds. I ought to have mentioned that the chaff given to my horned cattle, is not confined to hay merely; but most generally to a composition, consisting of an intermixture with hay, of a portion of wheat and rye straw, as also the tops of corn stalks, including the blades and husks. Two bushels of this mixture I am generally in the practice of giving, instead of hay alone, as might have been inferred from mine of the 17th above-mentioned; I have therefore thought, it would be as well, to give this explanation. I am about experimenting further on this subject; by reducing the quantity of chaffed hay, given to each horse, from 15 down to 12 pounds per day. I commenced on two of my horses from 8 to 10 days back, in order to see how it will operate. I am much obliged by thy offer of some seed of the scarcity root. I last year

got my seed of B. M'Mahon, which succeeded so well, that, I have been induced to obtain a supply, from the same place, for the approaching season : but if thou hast any of a superior kind I should be much pleased with having a few.

I remain with sentiments
of regard, thine truly.

ISAAC C. JONES.

RICHARD PETERS,
*President of the Philad.
Agricultural Society.*

General David Humphreys, President of the Connecticut Society of Agriculture, to Judge Peters, President of the Philadelphia Society for Promoting Agriculture, respecting the effect of the Season of 1816.

Humphreysville, Conn. Dec. 1816.

Dear Sir,

In acknowledging the receipt of your respected communication of the 30th of October, in which several very interesting questions are proposed, respecting the extraordinary season of 1816, I can only answer in part, and refer you to some anticipated facts and observations, on the same subject, in an article, inserted at the close of our Agricultural and Economical Almanack for 1817.

The principal injury done by early and late frosts, fell on our most important crop, Indian corn. Of this, there is not more than half the usual quantity; and, in many places in this neighbourhood, not more than a quarter part sufficiently hard and ripe for being manufactured into meal. That which is unripe, mouldy or soft, when given as feed to hogs and cattle, has little tending to fatten them. Mixing and grinding it with oil cake, has been found the best mode of using it.

Grasses, for pasturage and hay, have been diminished by the drought about 50 per cent. The hay is estimated to be nearly 25 per cent better than it is in wet seasons; containing considerably more nutriment, and having been well cured.

All kinds of grain were a longer time than usual in filling and ripening; which is considered one reason, why those which came to maturity are more than commonly

full and heavy. Wheat and rye never yielded more abundantly; nor was the flour ever whiter, or better for making bread. There was not so much straw as the preceding year, when the grain was in many fields blasted and shrunk. But the straw is bright and peculiarly well adapted for forage, when cut and mixed with bran, meal, or grain.

Roots and vegetables, in gardens that were well tended by having the earth frequently moved round the plants, early in the morning, while the dew was on the ground, have generally been more flourishing and productive than in ordinary seasons. Some attentive horticulturists observed that more dew fell than usual.

The grub-worm was never before so frequent and mischievous, as it has been in some places.

Plaster of Paris did not in general produce its usual good effect. To this, however, there were several exceptions, where its influence was very great. The frost did not injure the Indian corn so much, where it was dressed with it, as in other parts of the same field, where it was not treated in that manner. More damage was done by frost in the valleys, than on the neighbouring hills, to both fruits and plants.

It is a very remarkable fact, that individual roots and vegetables have been raised, the summer past, of a larger size, than in almost any former season; and that greater crops have been produced, on a given extent, particularly of turnips and carrots.*

One good effect of the season, has been, to destroy

* Ira Hooker, Esq. of Bristol, raised 800 bushels of turnips, on an acre and 20 rods of ground, and Mr. Leman Stone, of Derby succeeded in raising carrots, at the rate of 900 bushels to the acre.

the canker worms and caterpillars, which for several years infested and proved so pernicious to orchards. Another is, the considerable efforts made by farmers to supply the deficiency of hay, by successful experiments to raise other crops, which would not otherwise have been attempted. Much useful knowledge has been acquired from the experiments. A greater benefit will probably result, from the lesson on economy in feeding live stock, during the winter, which has been forcibly inculcated by the scanty crop of hay. Should the example become lasting, there is no calculating the benefit to the farmers and the country. At the end of the season for in-gathering fodder, there was not, it is believed, more hay in the barns, than there was last year, on the 1st of February.

The feeding of cattle with dry food has been happily postponed, up to this date, by the fine weather.

So favourable has the weather been for vegetation, that during three weeks in the month of November, the grass in pastures has grown as much, if not more, than it did, in any three weeks in the summer. To this time, the pastures have yielded sufficient feed for sheep, and most kinds of cattle; so that very little forage or provender has been expended. It has been observed that the butter, churned from the milk of cows thus nourished, has been equally sweet and well tasted, with that made in the spring or beginning of summer.

If any thing further, respecting this anomalous period shall occur, which may be deemed useful, I shall be happy in communicating it. Being

Very respectfully, dear sir, your most obd't serv't,

D. HUMPHREYS.

THE HON. RICHARD PETERS.

Pres't of the Philad. Soc. for promoting Agriculture.

On Gypsum.

Read April, 1815.

*Warren, (Va.) 26th March 1817.**Sir*

The third volume of the Memoirs of the Philadelphia Agricultural Society, contains some remarks on the unsatisfactory manner, in which Sir Humphery Davy has treated of gypsum, as a manure, which have induced me to submit to you the following hints on that subject. And, indeed, instead of shedding new light on the matter, as we might have expected, he has expressed doubts respecting some of its operations, which are familiar to every observant farmer that has used it. Such, particularly, as its power of promoting putrescence when applied to vegetable substances, either on grass, or the damp straw of a farm yard, or even on dry straw mixed with it, and stacked for the purpose of experiment, seem to be excluded by the result of his experiment on minced veal. Under all which circumstances, I know that gypsum hastens very much the dissolution of the substances submitted to its action, but if I could not produce better authority than my own, for dissenting from the opinion of a chemist so eminent, I should not now trouble you with my own respecting it.

Mr. Kirwan, in his treatise on manures, considers carbonic acid gas, as the most active principle of manure in promoting the growth of plants; and Sir H. Davy concurs with him, in his lectures on Agricultural chemistry; if that opinion be correct, we have the authority of Fourcroy for

the fact, that, by the mutual decomposition of gypsum and vegetable matter, carbonic acid is produced. I know not if his authority be competent to stand against that of Sir H. Davy; but the latter has cited it respectfully in his lectures, and that he was an eminent lecturer on chemistry at Paris, is well known. That his theory, or facts, be it either, agrees better with our farmers' experience than the other; will appear, I think, from the succeeding extract from his book.

“*Le sulfate calcaire* est decompose par un grand nombre de matieres combustibles, a l'aide de la chaleur. Le charbon des substances vegetales enleve a l'acide sulfurique l'oxygene avec lequel il a plus d'affinite que le soufre: il se degage de l'acide carbonique dans cette decomposition, et le soufre separe de l'acide sulfurique s'unit a la chaux, et forme ce qu'on appelle *hepar calcaire*, et ce que nous nommerons par la suite *sulphure de chaux*. Fourcroy, *Elemens de Hist. Nat. et de Chimie*, 5me ed. tom. 2. pag. 125. a Paris.”——

“The sulphate of lime, with the aid of heat, is decomposed by a great number of combustible substances. The carbon of vegetable substances deprives the sulphuric acid of oxygen, for which it has a stronger affinity than the sulphur; *carbonic acid* is disengaged by this decomposition, and the sulphur separated from the sulphuric acid, unites with the lime, and forms what has been called, *hepar calcaire*, and which we will recognize in future by the name of *sulphite of lime*.”

It remains to be inquired, if the fermentation of vegetables be sufficient to excite a heat adequate to the decomposition. We farmers know, that under favourable circumstances, it will produce fire; but as I have no preten-

sions to chemical science, shall not venture an opinion. It is worth remarking, however, that Fourcroy, in his enumeration of the uses of gypsum, although he pronounces it “une des matieres les plus utiles que la nature produise,” takes no notice of its use as a manure, unquestionably its most valuable and important quality, of which he must have been either ignorant, or incredulous, for its value of that kind, was known to the Germans, prior to the publication of his work. This omission, however, tends to render his testimony more impartial and satisfactory.

These facts, and the inferences derivable from them, are so analogous to the many suggestions made by yourself regarding the ‘*modus operandi*’ of gypsum, that I thought it would be personally acceptable to you to have them corroborated by high chemical authority ; and let me add, that I was led to investigate the subject, by the interest you appeared to assign it, in your many useful tracts on the value and uses of gypsum. I rely on your indulgence, for every attempt, however feeble, to investigate the principles or improve the practice of agriculture, as my apology for offering these remarks. Such speculations cannot influence the opinions of a practical farmer, injuriously ; and a thorough acquaintance with the means we employ, must, as in all other sciences promote that of Agriculture. With my wishes for the success of your Agricultural Society.

I am your humble servant,

JNO. PATTERSON.

TO RICHARD PETERS, Esq.

President of the Philad. Agric. Soc.

Richard Peters' junr. Esq. communication to Mr. Eastman, on Hotchkiss's cutting.

Read February 11th. 1817.

Green Hill, January 30th, 1817.

Sir,

The straw-cutter, invented by Mr. Hotchkiss of Vermont, and which I procured from you, I have had in constant use, during the past six weeks. My stock consists of fourteen cows and four horses, and during the whole of this period, they have been fed with hay and corn-tops, cut with this machine, instead of having been furnished with them in the usual mode. I am well satisfied there is a saving of at least one third in this method of feeding. My gardener thinks the proportion saved is greater, and equals one half.

The machine is complete and perfectly competent, to perform the purposes I expected from it. When properly attended to, it will cut, in much less than an hour more than all my stock will consume in one day; and the labour in using it is not great. Some care is required in supplying it with hay, straw or corn-tops; they must not be given in large portions, and they must be given equally. Those only who do not attend to these particulars can complain of the machine.

To livery stable keepers, and to those who dispose of cut straw, the machine will, if employed, be extensively beneficial; and farmers may bring to our market a very great part of the hay they now waste in the present improvident manner of feeding; should they use the machine.

I am very respectfully yours,

RICHARD PETERS, JUNR.

JOHN EASTMAN.

Samuel Betton's, M. D. Communication to the Agricultural Society, on Sugar Canes.

Read

To the President of the Agricultural Society.

Sir,

As the cultivation of the sugar cane, and making of sugar have become articles of primary importance in the United States ; allow me through you to communicate to the society some observations which I have just read from James Austin, Esq. of St. Ann's Bay, Jamaica, and along with them, beg leave to send some specimens of the four different kinds of cane now cultivated in that island.

I remain yours very respectfully,

SAMUEL BETTON.

Germantown, January 13th, 1817.

Bambou cane. Requires a very rich moist soil, they will produce more sugar, and that equally good, than any other cane ; they require when plants, to be in the ground sixteen months before cutting, and not to be cut under fourteen months, as rattoons ; the plants generally yield from half a ton to four tons of sugar to the acre.

Ribbon cane. This will do better in a light poor soil, than the bambou ; endure dry weather much better and ratoon longer, will also give more sugar on a poor soil than the bambou, they ought not to be cut as plants under fourteen months, and if there is not much rain you

may cut the rattoons in eleven or twelve months; the plants generally give about three tons of sugar per acre.

Transparent, or Mont-Blank cane. This cane requires the same culture as the ribbon cane, it however makes a light coloured sugar, and about the same quantity.

Creole cane. They take a much longer time to ripen than any other, the plant requires to be eighteen months old before they are cut, and the rattoons sixteen, they have been known to *Ratoon* thirty years, the sugar made from them is of a very fine quality, and the plants yield from one and a half, to two tons per acre.

On refining the cane juice previous to boiling. Take a quantity of the inner bark of the bastard cedar (*Butroma Guazuma*, of Brown) and rub it in a bucket of cane juice until it produces a mixture of the consistence of starch; but if mixed with water, of the consistence of the white of egg, then throw into the grand copper, as soon as the cane-juice begins to simmer, four gallons of the mixture, to every hundred of the cane juice, which causes all the dirt to rise to the top in ten or fifteen minutes; and that skimmed off, leaves the liquor perfectly pure, and consequently does not require any skinning in the other coppers. It was at first feared that the grain of sugar prepared in this manner would soften in an European passage; but experience has proved that it remains as firm as that made in the old manner. The mode by means of the bastard cedar bark, is particularly adapted to those properties which make a dark heavy sugar; as it has made a difference of 10% sterling per cwt. in the sale of some, thus circumstanced.

On Tangier Wheat.

Read

*Brandywine Mills, 11mo. 10, 1816.**My Friend,*

I have observed in a newspaper of Wilmington, a notice that the Agricultural Society were desirous of obtaining information on certain particulars relative to the past uncommon season, and that thy name is given as the person we are to communicate with.

As the Society was pleased last year to send me a small quantity of rye of an uncommon quality, I distributed it among four farmers of Pennsylvania, four of New Jersey, four of Delaware, and one in Maryland, an ounce to each; desiring them to inform me particularly in relation to it (agreeably to the enclosed copy of a letter accompanying each parcel.) I have heard from very few of those to whom the rye was sent; principally, I apprehend, because the seed generally perished in the ground, and no further notice of it was thought necessary. With two or three persons it succeeded so far that they have obtained, some a few grains, and in one instance, a farmer in New Jersey, on Denniss's creek, has obtained about an ounce, from which he brought me the small quantity enclosed, with a head of the rye also enclosed.

In time, perhaps, this grain may be naturalized to our

climate from the small quantity preserved, and if it succeeds any where, I presume it will in New Jersey, as that state has usually raised rye of a better quality than any other that I have been acquainted with.

I have been informed that considerable crops of rye of the same species as that at present under consideration, have been raised in Pennsylvania some years since, but why it is not cultivated at this time I am not informed. From an examination of the grain, I am induced to believe that it will make a flinty, harsh flour, and on that account may have been disused; though I apprehend our soil and climate might operate a great change in this particular, if cultivated on light sandy lands.*

Since my memory, I think the United States have never been favoured with wheat of a better quality than in the present year, as far as my knowledge extends; that is, to Pennsylvania, New Jersey, Delaware, Maryland, and Virginia, from whence we have had wheat this season.

On the contrary, Indian corn will be but poor in qua-

* The grain here mentioned is a very precarious crop, and has not thriven in Pennsylvania, so as to justify an extensive culture. An account of early experiments on it will be seen in our volumes, and repetitions have not been encouraging. It is the TANGIER WHEAT of the Mediterranean, and also grows in Persia, and other eastern countries. Mr. Poole's observation that its grain is *flinty*, is correct. It may succeed in the southern states, wherein some specimens are encouraging; and its appearance being very inviting, it is to be hoped further trials will be made.

It has been deemed best by several intelligent farmers to sow it in the spring. I have not had flattering results, in this mode; and it is hoped, that favourable accounts may be yet received from more successful experimenters.

R. P.

lity and short in quantity, distressingly so I fear ; though there may be instances where both quality and quantity are tolerable. I myself have had about thirty-five bushels of good corn to the acre on a town lot, with much soft corn.

Buckwheat I believe has generally failed. Rye I know but little of, but from the great price it had attained a month since, I presume the crop is a short one. We have had a good crop of potatoes in this neighbourhood, both in quantity and quality. Garden vegetables have been various ; cabbage in great plenty, sweet potatoes poor, and water melons not good. Apples and pears of all the different kinds abundant and fine. Peaches of good quality not so plenty as usual, and generally of but indifferent quality.

As far as my observations have extended or been directed to such objects, it is my opinion, that there have been fewer insects this year than is common to warm seasons, and as a consequence in degree of this circumstance, I think we have not had as many birds about the house as usual, excepting the black kind.

If these particulars will have a tendency to forward the views of the Society, I shall be gratified : they have been drawn up in haste, but are, I believe, correct.

Thy Friend,

WM. POOLE.

On the disease in wheat called Stunt. By Thomas Plater, Esq.

Read December, 1816.

Georgetown, Dist. Col. Nov. 21, 1816.

Dear Sir,

When I had the pleasure of seeing you in Philadelphia, you expressed a wish I would communicate the information I possessed relative to that destructive enemy to agricultural interests, the sedge wheat. I shall state briefly the matter of fact arising out of my own experience; thereby shewing the success which has attended me in its removal: it not being my intention to investigate the nature of the disease, which appears to have admitted of a variety of opinions, without a remedy. My farm, situated on the waters of the Potowmack in Maryland, is comprised of about 900 acres of low fertile land, containing four divisions: the system of agriculture pursued has been corn and wheat in regular rotation, the pasture fields always in clover. In the autumn of 1808, I procured 100 bushels of red lammas, or what is called here red straw wheat, which was sown that season from the first to the middle of October, having none other on my farm; it succeeded fully to my wishes, the three first years producing the best crops I had ever taken; the fourth year, in the richest parts of the field which had been manured, I discovered an acre or two, whereon there was an entire cessation of growth, after it had got rather more than a foot high, standing in bunches resembling broom sedge. Unable to account for it, I

had recourse to the memoirs of the Philadelphia Agricultural Society, which gave to me its first character. I continued to sow it the two succeeding years, the last of which it had so rapidly spread, as to cover forty acres that barely returned the seed. The profits of the farm being considerably diminished, I determined to change my seed, disposing of every bushel, and purchased one hundred bushels of what is known here by the blue stem wheat, grown thirty miles distant. I sowed a part of it on the two acres; the sedge first appeared, and a better crop both as to quantity and quality I never cut: the same has been continued on the unproductive forty acres mentioned, and the residue of the field, producing most abundantly and to the entire extinction of the sedge; all which I think forcibly urge the expediency of a frequent change of seed, the neglect of which no doubt is generally the cause of disease in the crops, and ruin to the farmer. The loss I sustained had induced me to advertise my farm for sale, presuming it was irrecoverable: no purchaser offering, it has reassumed in my estimation its original worth.*

With sentiments of respect,

I am, Dear Sir,

With great consideration and esteem,

Your obedient servant,

THOS. PLATER.

Hon. WM. TILGHMAN, Esq.

* See my remarks on this subject, in a note, folio 25, which should have had my signature; not for *its* weight, but *my* responsibility.

R. PETERS.

Observations on the Summer of 1816.

Read Feb. 1817.

New York Nov. 29, 1816.

Sir,

I have had the honour of receiving the circular resolve of the Philadelphia Society for promoting Agriculture, passed October 30, 1816, which you were good enough to direct to me.

I agree with the Society so entirely in opinion, that I collected the phenomena of solar spots, and the facts concerning Newfoundland ice, and recorded them in the 3d No. of the 28th volume of the Medical Repository, p. 301—307.

The season, though unusually cool, was nevertheless warm enough to ripen strawberries, raspberries, currants, cherries, gooseberries, pears, plums, and apples. They were generally very fine. The ox-heart cherries in particular, were unusually large and abundant. This autumn apples are, fairer, cheaper, and more plentiful, than they have been for many years. Peaches were poor, owing to the distemper of the trees of several years standing.

It is certain that the fruit has been damaged less by insects than is usual. An entomologist complained to me, a few weeks ago, that it had been a most unfortunate season for the collection of insects. That kind of game, he said, was so rare, that he had added but little to his museum.

There ought, however, to be an exception made in relation to a sort of voracious larva or grub, which has done incalculable damage to pastures and meadows. It is a whitish, blind, hexapodal thing, more numerous in the soil than has been often observed, and co-operating with the cold and the drought of the summer and autumn, has destroyed in many farms the grass so entirely, that not a green blade remains. I have not experimentally found the *imago* into which this creature is metamorphosed. But some of my friends, who declare they know, have assured me that it is the great *night beetle* of the summer months. There have been at New York fewer fleas and musquitoes than ordinary.*

There will not be half a crop of maize on Long Island, and in the southern district of this state. Further northward there will be less. The buckwheat is so scanty, that a few days ago I paid four dollars for a half barrel of the meal, for the use of my family.

The winter crop of wheat and rye was abundant; yet the alleged scarcity in Great Britain has so raised the price of wheat and flour, that the former is selling at two dollars and a half the bushel, and the latter has actually, within a few days, been sold for thirteen dollars the barrel.

* This is the grub of the Cock-chaffer, which often injures pastures and other grass grounds; and has not been known materially to prey on young Indian corn plants, which grow beyond its reach, before the season when its ravages are dangerous. It delights most in soddy grounds; and preferring to live in greater depths under the surface, than other progeny of insects; it is frequently protected, and enabled occasionally to visit the face of the ground in vigour, whilst those which inhabit the surface, or remain in shallow retirements, are destroyed in anomalous seasons.

price of thirty-seven and forty-five cents, and excellent turnips at thirty-two the bushel.

Hay and oats are enormously dear. The price of milk was raised from eight cents to ten, in the course of the summer; and my milkman this morning gave notice, that the price would be further raised to twelve cents and a half.

I write you these facts as they occur to me. If practicable, I will send you more. In the mean time I assure you of my high and respectful consideration.

SAML. L. MITCHELL.

ROBERTS VAUX, Esq.

Secretary of the Philad. Agric. Soc.

Observations on the Season, and its influence and effects on vegetation, in the year of 1816; beginning with those belonging to Agriculture, &c.

Read September, 1816.

Influence, beneficial; on wheat, (*triticum hybernum.*) The theory or opinion, that a cool, dryish, season is the best for this kind of grain, has been realized this season; as far as my knowledge extends. Wheat is heavier and thinner skinned than usual, with the exception of that injured by the fly, which circumstance appears foreign to the present inquiry: about two weeks, or rather less, later than usual getting ripe; exempt, notwithstanding, in a great measure, from mildew; owing no doubt to the cool, and of course less humid, atmosphere.

Rye, (*secale cereale*) As this grain flourishes in a high latitude, the above observations may apply.

Beneficial on Oats, (*avena sativa.*) This season has produced good crops of this grain, though probably it might be attributed in some degree to a warm and wet time, or at least showery, in June; yet we find the best oats are raised in cool climates.

Barley, (*hordeum v.*) Crops tolerable good.

Flax, (*linum usitatum.*) Tolerably well growed and well seeded; a cool season is said to be favourable to, or produce the finest grained flax, though less in quantity.

Buckwheat, (*polygonum fagopyrum.*) The season,

from its being cool, was favourable to this kind of grain, had no adventitious counteracting circumstances occurred; but its salutary effects were frustrated by a drought which came on a short time after it was sowed, and continued so long as to retard its growth and blossoming; it appeared a week or two to be in statu quo, and of course the crop was much jeopardized by this circumstance. Had the frost been absent the length of time longer than usual that the drought existed, there would have been a much better crop;* but even this would not have removed the effect altogether, as its growth in consequence was very diminutive, and as the frost came on as soon, or rather sooner than usual. This, in addition to the drought, has caused the crops to be less this year than in any one within my memory.

Influence injurious—on Indian Corn (*zea maize*.) This valuable, or rather invaluable grain, seems indigenous to the tropical countries, or at least grows best in long, warm summers, and as it takes nearly the whole of the season here to perfect its fruit, and it being a tender plant, cannot far pass its usual period of ripening; so that a short season, even if warm, will much hazard a crop; but if the season is both short and frosty, it must inevitably follow, that crops will be very trifling, which is the case at present; in addition to the above unfavourable circumstances, the cut worm in the spring did immense damage all over this part of the country: corn was planted, re-

* When the frost came, the buckwheat was bending under its load of blossoms and grain, remarkably full, probably one half of it yet in the milk.

planted, and replanted again till the middle of June ; the last produced no corn at all. I presume there has not been much more than one-third of a crop, and that mostly soft ; in many or most places, the blades of the young corn were killed by the frost about the middle of May ; and in the fall, frost came when the corn was completely in the milk. The first frosts seem to have been harder, or more severe, than usual, which did much damage to corn and buckwheat ; in a greater degree along creeks and small streams of water. It is remarkable the contrast between the crops on the high and low lands ; and the low more especially by the rivulets. Cold seems to be generated by moisture, or at least this appears to facilitate the transition from heat to cold ; but if the source from which the pluvial particles arise be very copious, and warmer than the surrounding atmosphere, the case will be reversed ; and we shall find it, in those instances, to be warmer than in other places. This is verified every year by the side of our large rivers ; the lakes of Canada also bear testimony to this ; the season in the fall of the year being much milder contiguous to the lakes than farther off : as water is a much more dense body than air, the transition from heat to cold, and vice versa, will of course be slower. During the summer, those large bodies of water have increased their temperature, till it has nearly arrived to that of the atmosphere ; and as the latter in the autumn is still growing cooler, the former is incessantly giving out heat ; which has a very salutary effect on the adjacent country ; though, on the same principle, in the spring of the year, the lakes ; being covered with ice, are continually, till it is dissolved, and for some time after, giving out cold ; which has a very unsalutary influence on vegetation. The

kind of corn generally planted with us, is what goes by the name of yellow gourd seed, rather late of ripening in common seasons; very different from what was planted 40 years ago, which was a hard, yellow, short eared, corn, that ripened 2 or 3 weeks earlier than G. seed, but not very productive. There is at present cultivated a long-eared, hard, yellow kind, with shallow grains, and but few rows on the ear, that ripens early, and has the present season made a tolerable crop; of late, it has not been generally planted, as it is not very productive.

I believe if corn, even this season, had been planted on high, south lying land, more especially if it had been manured from the barn yard, would have produced a tolerable crop, provided it had been put in at the usual season; those that manured with lime, I think had worse crops than if there had been none put on; owing, I conjecture, *to that manure being of a cold nature*; it rather co-operated with, than counteracted the effects of the season.

Potatoes, (*solanum tuberosum*,) crops tolerable; somewhat injured by a temporary drought, when they had arrived at about three-fourths of their usual size; the tops dying at this time, it is presumable the potatoes terminated their growth. I suspect the season was not too cool for this vegetable, as it grows luxuriantly in a much higher latitude; it being a hardy plant, and comes to perfection very early in the autumn.

Potatoes sweet, (*convolvulus batatas*,) owing to the late, cool, and frosty spring, many of them rotted in the ground (at least with me) though on a southern declivity, and sandy soil; which seems the most eligible for this vegetable; and, like the Indian corn, appears to be indi-

genous, farther south than the latitude of 40 degrees north.

My method of raising them is, to have the hills small and peaked, manured with compost reduced to a fine tilth, one large cutting in each hill; the nearer the young potatoes grow to the edge or side of the hill, where the atmosphere can have access, the larger will their growth be; the cold was so severe last season after I planted, that it became necessary to cover them with stable manure, while in the state of fermentation, which was taken off in the day time, if the sun shone warm.

Water melons, (*cucumis melo.*) Ripe later than usual, and injured by a wet spell in the last part of their season: too cool generally through the season for this plant; as it rather appears to be out of its latitude. It bears heat and drought admirably; or rather it delights in a hot, dry, and sandy soil; though it is remarkable, that the frosts in May did not injure them as much as some other vegetables.

Pumpkins, (*cucurbita pepo.*) Generally not so large nor so rich as in ordinary seasons.

Squashes, (*cucurbita verucosa.*) As this vegetable perfects its fruit in the warmest part of the season, and is probably a native of our latitude, I did not discover that they were better or worse than other years.

Cucumber, (*cucumis sativus.*) This fruit is much the best in cold weather, and seems to luxuriate in moderately wet seasons, in great plenty with us the preceding summer. The early planting was almost totally destroyed by the frost in May, except where they had been sheltered.

Beans, (*phaseolus vulgaris.*) The first planting killed by the frost, the second a tolerable crop.

Peas, (*pisum sativum*.) Uninjured by the frost ; I think not as productive as usual.

Strawberries, (*fragaria vesca*.) Scarce ; killed in some places by the frost ; the season too cool for them : not well flavoured.

Apples, fruit of the *pyrus malus*. In great plenty, hung on the trees remarkably well, owing to their being more immature than in ordinary seasons, which must be attributed, to the absence of heat and shortness of the summer ; not as well flavoured as usual, but it is supposed will keep better through the winter ; as fruit of almost any kind will keep longer, if taken off some time previous to its coming to maturity. Cider made this year appears to be weaker than common, generally made late, which probably will not ferment before spring, if ever it does, and in this state I apprehend it to be very little worth ; even that which was made early in the fall from the best kind of fruit, did not ferment as rapid as is usual at that season of the year, either from the coolness of the weather, or for want of that saccharine quality which is so essential to the vinous fermentation (and which appears to exist but in a small degree in all unripe fruits) or both. I am informed that cider at the distilleries did not ferment as usual, or become ripe in the same length of time as in other seasons ; and I apprehend will not produce much alcohol. Summer apples remained on the trees much longer than the usual time, some even till winter ; those that ripened early, tolerably well flavoured ; but others ripening as the season advanced, became more insipid, and that in direct ratio.

Peaches, (*amygdalus persica*.) But few trees in this part of the country ; but what came within the range of my

observations, were very full of fruit, smaller than usual and later, without flavour, or rather ill-flavoured; trees that formerly bore sweet fruit, now bore sour, or at least insipid; what I saw was scarcely eatable.

Pears, (*pyrus communis*) the same observations will apply here as were made on the summer apples; in great plenty.

Quince, (*pyrus cydonia*) I believe scarce; but my observation on this article is very local and superficial.

Cherries, (*prunus cerasus*.) Remarkably plenty; not as good as in warmer seasons.

Plumbs, (*prunus domestica*.) Generally not well flavoured, though some local favourable situations, as great exposure to the sun's rays and gravelly soil, produced very good fruit.

Apricots, (*amygdalus armeniaca*.) Scarce, and, owing to that circumstance, larger than common. Suffered in point of flavour, like most of the foregoing.

Grapes, (*vitis vulpina*.) or a variety of it, in my possession. As plenty, and nearly as fine, as in other years.

I shall just observe, that the seven foregoing kinds of fruit, have suffered less from insects (in their first state of existence sometimes called larvæ, eruca, or worms,) than in any other year within my recollection: owing no doubt to the frigidity of the season, keeping the insects in a dormant state, till the rinds of the fruit became too hard to be perforated by them; or the season too far advanced to give time for the eggs to hatch before the fruit came to perfection.

Forest Trees.

Hickory (*juglans alba ovato.*) Nuts of this kind are in great plenty, perhaps more than usual. In many instances the kernels are shrunk, not filling much more than half their cavities ; in others entirely empty. Whether the cause originated from the multiplicity of the crop, or from the cool season, I cannot say ; but most probably from the latter. It was observed, when given to a pet squirrel, that it refused to crack or open some of them ; which led, in one instance, to a discovery that many of them were not good.

Chestnut tree, (*fagus castanea.*) Nuts nearly as plenty as in other seasons, but much smaller and later ripening ; some on the north side of trees not more than half their usual size ; fewer worms in them than usual.

Oaks, (*quercus* ;) but few acorns of any kind ; probably the cause did not originate from the coolness of the season, as it occurs often in very warm ones. The female blossoms, or bud, may probably be killed in the winter season, or the male flowers, or rather the pollen, may be destroyed by a series of wet weather, or blown away by high winds. If some of the above circumstances or causes did not take place, I think there would be acorns every year ; it being a genus belonging to the class *Monoe-cia*, and the male and female blossoms being very near together (which is not the case with all the trees belonging to this class) would be nearly as sure to produce fruit, as if the blossoms had been hermaphrodite.

Pine, (*Pinus strobus.*) I think the seeds of this tree were scarcer than usual, and many that had a good appearance, had no kernels. Plenty of cones or strobiles.

From the uncommon frigidity of the summer of 1816, it would be inferible, that the growth in trees would be less than in other years. This I found to be the case; on opening, or cutting into them, it became very obvious. The experiment was made on different trees; and, in several places, the last years growth in some of them was not more than half as great as the preceding one, and, in one instance about two thirds as large, &c.

If any of the above observations will be of use to any of the members of the Agricultural Society; the end of writing will be answered.

N.B. I omitted saying any thing on the grasses: I observed the red clover, (the second crop,) to be more blasted in the leaves than usual; and very irregular in ripening; young stalks or shoots still coming up as the others were getting ripe. Cut much later than common, and not, probably more than half a crop of seed; though a tolerable one of hay. Crop of grass in general, and of every kind, less than in other years.

P.S. I shall just add; that insects, bugs and flies have done much less damage last season than other years: I do not consider the cut worm and Hessian fly to come under the above characters. I think the damage done to the wheat by the fly, was principally in the fall of 1815. We were remarkably exempt from the depredations of the rose bugs. I have known them to almost destroy or prevent a crop of grapes, by eating the very germen of the flower; and most of the other parts of the fructification. And likewise the blossoms of the Virginia thorn, (*Crotægus Cordata*.) and evergreen thorn, and many other kinds. The bugs and flies, that infest cucumber

and squash vines, visited them later, or rather it was later in the season before they made their appearance, and I think did much less damage; as the cool weather would naturally operate against their multiplication. Very few caterpillars; and I do not recollect seeing any of the blistering flies, (*Lytta vitata*,) this season, though, in some others. they have been in great plenty, on the potato and beet tops, &c.

With respect to fruit, it may be considered as a general rule; that all those kinds that come to perfection, or maturity in the months of July and August, when the heat is the greatest, would of course be better flavoured, in this or any other season, than those that ripened earlier or later. And it may also be observed, that fruit, of whatever kind, that was late of ripening, or required the whole summer to come to perfection, in other seasons, could not come to maturity in 1816. It might be said, that every thing was two or three weeks behind hand, throughout this extraordinary year.

East Marlborough Township, Chester county, Pa.

December 31st, 1816.

Communication relative to the periodical freshes every fourteen years in the Delaware and North East Branch of the Susquehanna rivers, &c.

Stockport, March 1st, 1817.

[ On the *Delaware*, below its branches. The waters of the western branch of *Delaware*, and those of the north east branch of *Susquehanna*, nearly approach each other.]

Respected Friend,

I have not forwarded you any communications for some time; but, by perceiving some of my memorandums and observations, I consider the curious circumstance of the periodical high freshes in the *Delaware* and *North East* branch of the *Susquehanna* every fourteen years, worthy of notice in the natural history of our country. I shall therefore proceed to state the facts, with some of my observations of their effects on agriculture.

When I began my improvements in the year 1788, there was then living at *Coshecton*, a very aged man, by name *Joseph Ross*, who had resided most of his life among the native Indians, understood their language, and was a man of a strong clear mind. He came to see me for the purpose of giving me some friendly advice; that was, to set all my buildings sufficiently out of the reach of the periodical 14 years high freshes; and, as there had been one two years before, we could readily see, by the drift wood, how far it had reached on the banks. He informed me that the native Indians had a traditional account, that every 14 years there came a great flood in these rivers, 6 or 7 feet higher than took place at any intermediate times; for which reasons the Indians were in the practice, in the fall before they come, to remove their corn and stores on

the highlands; that he could remember four of those high floods; viz. in the years 1744, 1758, 1772, 1786, and that they had all been nearly of the same height; and, to his knowledge, there had been no freshes, in the intermediate times, as high by 6 or 7 feet; therefore there would certainly be another in the year 1800. He said he gave me 12 years warning; and I had seen and could remember the great spring fresh in the year 1772; as also the great fresh in September 1786, called the great pumpkin fresh: yet I had not then full faith in Indian tradition. Time passed on; and none of our highest freshes reached the mark of the last fresh by 7 or 8 feet. In the spring of 1800, I was largely engaged in the lumber business; and anxious to have the lumber drawn as handy to put in the water as possible. We had a tolerably deep snow; and there came on a heavy and steady warm rain for three days and nights, that raised the river to the mark of the pumpkin fresh in the year 1786; it flowed over my farm, swept off most of my fences and my lumber, to a very large amount; although every exertion was made to save it. The Susquehanna also rose, and swept the farms.

As to its effects on agriculture; my mowing ground was all covered with mud, that smothered the grass for a time, but on the whole proved an advantageous manure.

I had a few acres of wheat on new ground, that looked very well before the snow fell; the back water covered it for upwards of twenty-four hours, and left it also covered with mud: the consequence was, it *turned all to cheat*; and when harvest came, there was a heavy load of cheat, and not a stalk of wheat to be found. Strange as this may appear, Nicholas Depui, Esq. late

of Minesink, informed me that by the great spring fresh in 1772, he also had a field of wheat all turned to cheat, by being covered with water twenty-four hours or longer. I had also some rye covered like my wheat; and I believe it was of benefit to it, for it was unusually good.

My heavy losses had then converted me to the Indian belief of periodical floods every fourteen years. We had no freshes as high by seven or eight feet, until April 1814. I was that spring detained in Philadelphia, and, fully expecting such a flood, I wrote to my people to draw the fences, lumber, &c, out of the reach of such a flood. They had obeyed my orders in part, when the flood came by means of heavy warm rain taking off the snow suddenly; and rose the river to about the same height of the other fourteen year flood: the wheat was only partially covered with back water, and was partially turned to cheat; the rye was manifestly benefited. I never saw better.

A part of the flooded ground was ploughed for Indian corn and buckwheat, which grew with a luxuriance equal to the banks of the Nile. I am fully convinced, that the mud deposited by such floods is a rich manure.

It was singular that the spring flood of 1814 chiefly came out of the East Branch; which was much higher than ever known before: it swept the shores, and much damage was done to the farms; while the West Branch and Susquehanna were not higher than in common spring freshes. August 20th, 1814, my friend, John Hilborn, who lives on the Great Bend of Susquehanna, came to see me. He observed that the *Indian rule of a flood every fourteen years was either broke or run out*; as, that spring their river had not been higher than common. I told

him, that the Pumpkin fresh kept off until September. I had occasion to go to Newburgh; where, on the 2th of August was the heaviest rain ever known by the oldest inhabitants: the floods were such as to wash down stone fences that had stood forty or fifty years.

When I reached home, I found that the water had been a few inches higher than ever marked before by any of the fourteen year floods; my farm was lying a common, as to fences; and all covered with mud: to have a farm so exposed in the beginning of September, is more inconvenient than in April: we had hay in plenty, and stabled the stock.

From my people I learned, that the rain was on the 28th of August, as at Newburgh: that the river being very low, they were apprehensive there was not rain enough to raise it to go with a raft: in the afternoon it began to rise faster than ever was seen before; that the rafts tore away, with the drifting trees with which the river seemed covered; it almost all came out of the West Branch; which was four foot ten inches, or five feet higher than ever known before; it swept every thing before it; and the damage was great. Bridges, mill-dams, &c. all went together, and left a clear channel. My pumpkins, cucumbers, melons, and beans, were totally killed, wherever the water came: where the water covered the tassels of the corn, it killed it totally: where it covered the silk of the ears, those ears neither grew nor ripened any more: where it only came round the stalks below the ears, it had no perceivable effect; the buckwheat was covered all over, and bent down with a load of mud; it kept green until frost, but ceased to grow. My potatoes were all under water; the tops did not appear to be killed, but neither tops nor roots grew any more.

The second crop in the meadows did not grow through the mud ; as in the spring of the year.

The water was up among the limbs of some of my apple trees that were loaded with apples ; it checked their growth, but they ripened to perfection ; and the leaves fell from such trees sooner than those that stood above the water ; my turnips were a curiosity : they were covered with water from ten to twelve or fifteen feet, the water left them covered over with mud three, four, or six inches deep. I thought them all dead ; late in the fall, they began to peep out, and on examining them they were very small ; the snows fell before the ground froze ; they put out again in the spring, were grown to a large size, and I never saw such good sweet turnips before, nor so many for the ground, but they were of short duration ; they would grow, in or out of the ground. In the course of my reading, I have met with but one author that notices the effects of floods on vegetables, that is, my favourite author Dr. Darwin ; see the first additional note, page 525 of his *Phytologia*. Thus I have given a true statement of facts respecting the periodical floods every fourteen years ; and leave it for others to account for the cause. To my certain knowledge, they have been regular ; for as many periods of fourteen years, as my age enables me to remember correctly ; and I as fully expect such another flood in the year 1828, as I expect the return of the seasons.*

Thine respectfully,

SAMUEL PRESTON.

* *Susquehanna rose* similar to *West Branch* ; and convinced Jno. Hilborn the Indian rule stood good.

*On the Importance of the Navigation of the Delaware
and Susquehanna Rivers.*

As I have promised my observations on the very great and growing importance of the navigation of our rivers Delaware and Susquehanna: in order to fully understand the subject, it may be necessary to view a map of the country to see the great extent of fertile territory drained by those two long rivers, and their tributary streams, that either may be rendered navigable, and then reflect, how bountifully the Creator has furnished those parts distant from the seaports with the necessaries, if not the luxuries of life.

The whole country on and near the heads of these streams abounds with timber of all descriptions suitable for floats to convey their produce to market without the labour of crossing any steep hills or mountains; the country abounds with salt, plaster of Paris, limestone, coal and sugar trees, if not iron; and very few heavy articles will future generations wish to convey back: it will almost exclusively be a down stream trade, and I presume principally on rafts of different descriptions of wood, which will ever be wanted near the seaboard for fuel, and suitable timber for buildings and mechanical purposes.

When I take a serious view of those beautiful rivers, I consider that creative wisdom hath formed them perfectly

right, if man did but understand them, and would but apply a little necessary labour, to remove the rocks and obstructions out of their natural channels; then there would be safe, easy, level roads through all the steep, rugged mountains; such as cannot be made by land; for the loads will journey on, without the expense of teams. These rivers they run under like the ancient Roman aqueducts, that are to accommodate more territory, and give the streams a more gradual descent; for if the face of the country had not been created descending, the waters would stagnate, and the air become putrid.

But, it may be objected to this mode of transportation, that, in the summer, these rivers are too shoal for want of water; and, in times of high freshes, too rapid and rough to be navigated with safety. This I admit; and every person, well acquainted with navigating the Delaware and Susquehanna, must readily admit, that more water runs down these two rivers, every year in times of high freshes, than necessary to render them completely navigable all summer, if the stream were uniform. Therefore, taking it for granted that the quantity of water is more than amply sufficient for all the desired purposes, it remains for me to shew, that Providence has amply provided cheap and ready means for man to regulate the quantity of water, that annually flows down these rivers, in any uniform proportion or time he pleases.

Where I live we call it a complete safe raft fresh, if the river rises 4 or five feet perpendicularly above low water mark. What we call high freshes, too high to run the rough falls, is from 10, 12, 14 to 16 feet perpendicular;

and the 14 year floods, have been 22 feet perpendicular above low water. I am well satisfied by experience, that if all the rocks and obstructions were cleared out of the natural channel of the Delaware, that three feet perpendicular above low water, would be sufficient for raft navigation.

The mode of regulating the quantity of water is as follows.—On the heads of those rivers, and on all the streams above the Blue Mountain that feeds them, are very large ponds or lakes, one above another. All of such lakes that I have examined, appear to empty out through deep narrow channels; and I have been of opinion, that they were formerly more deep and large than at present, and that the channels have worn with time. My plan is, to make dams on the outlets of all the ponds, 10 or 12 feet, and in some places, more feet in height; and retain the water in high freshes, to draw off and supply the rivers in any such proportions as occasion may require to continue them navigable all summer. In the winter, when the navigation is obstructed by ice, let them all be shut, and the water reserved until spring.

I have long considered the subject, and sought for certain *data* in vain; that it is rather an estimation. I have considered that the quantity of water, that runs down either of these rivers, is in due proportion to the extent or surface of country on which the rains and snows that fall, drain into them; then on what proportion of the surface of ground that supplies these rivers would the waters descend or drain into such ponds or lakes. I should think 2 thirds the water; and I believe

the estimation would be perfectly safe at saying half the water that feeds the Delaware and Susquehanna, above the Blue Mountain, may be made subservient to our purposes by such means, and that half of such water would be quite sufficient for the purpose.

I first took the idea from the stream called *Muskonkong*, in the state of Jersey, which issues out of a large pond or lake, some say 20 miles long, as it turns among the mountains. On the outlet is built a dam, that was about 15 feet high, and what water raised in the pond, was all the head and fall, for a forge and grist and saw mill, that used to run very steady, and keep the stream uniform to the Delaware.

A larger experiment of the kind was fully tried during the war of the American revolution. The late General *James Clinton*, with whom I was well acquainted, informed me, that he first explored the navigation of the upper part of Susquehanna river being appointed to command a division of the army to join General *Sullivan*, at Tioga Point, to dislodge some hostile Indians and Canadians. (See the Map.) He cut a road, and marched his army and baggage from the German Flats to the head of Otsego Lake; there made flat-bottomed canoes, and dammed the outlet of the lake for six weeks, and raised the water so that it made such a rise in the river, as to float them down to Tioga Point, with their munitions of war and provisions. Some years afterwards, he was appointed one of the commissioners on behalf of New York to run the state line to Lake Erie, and pursued the same route and plan to convey his baggage and provisions to Tioga Point.

Dams on the outlets of these lakes would afford the best water powers for mills or any kind of machinery. By drawing the water from under the ice in winter, it will be so warm as not to freeze on the wheels as was the case at the pond on Muskonnekonk.

Such dams at all the lakes and ponds would not injure any interests of the country, and using them for mills would also tend to render the waters in the rivers uniform in their quantity. The confining so large a part of the waters that make the great floods, would also be of important advantage and safety to the farms on the banks of the rivers. The free navigation down the rivers, would be abundantly cheaper than by way of canals and locks.

When I have with great pleasure travelled the margins of these lakes, to view the advantages of such dams, I have admired how very perfectly all our rivers and their tributary streams were created for such a mode of improvement, and exclaimed with the poet *Cowper*—

“ God made the country, man the town.”

It may be asked, what kinds of produce are to be expected from the heads of those waters, if the recommended improvements in their navigation were made? I answer,

1. Salt,
2. Plaster of Paris,
3. Lumber of all descriptions,
4. Grain, in proportion to the cleared lands,
5. Stone Coal for fuel for the city,

6. Wool ; if our legislature would raise the bounty for killing panthers and wolves, to a law of extermination ; for the mountains on the heads of these rivers, are better sheep pastures than the mountains in Spain.

7. Such a system of improvements would tend to encourage agriculture in all its branches ; and when every visionary system of speculation is fully tried and proves abortive we may then adopt the language of John, "*As for the earth out of it cometh bread.*"—chap. 7, 5.

Thine respectfully,

SAMUEL PRESTON.

Extract of a Communication to the late Bernard M' Mahon, of Philadelphia, deceased, on the culture, management, and uses of the Mangel Wurzel, or Root of Scarcity, by Mr. John Lloyd.

Fully convinced of the manifold important advantages to be derived from the cultivation of this invaluable vegetable production, I take the liberty of transmitting you the following detail of its culture, management, and uses.

This root, not being well known with respect to its culture and use, fell into disrepute, until within these four or five years, when the Marchioness of Salisbury introduced it among the agriculturists of England. Many of those who received this valuable root from her ladyship, have repeatedly saved from 60 to 90 tons off the English acre. Its seed was introduced into this country, (Ireland) in the year 1787, by a Mr. Edward Lindsey, who, at that time, procured some packages from Dr. Letsom, of London. Its good qualities not being then known, or mode of culture understood, it fell into disuse, as in England, and has only been revived within these few years.

Mr. E. Lindsey, wishing to further the general cultivation of this inestimable vegetable, constructed a machine to facilitate the sowing, which has answered the purpose remarkably well, and now large fields are to be

seen of it; and most persons have had abundant crops. The leaves produce two or more crops in the seasons of summer and autumn, and both leaves and roots are most valuable for feeding milch cattle, and unlike Turnips or the Brassica species, communicates no bad taste to the milk, but much improves it with a very delicious flavour. They are also allowed to be remarkably good for feeding pigs.

From the many instances which can be adduced, one only is here necessary to point out the superior merits of Mangel Wurzel:—Wolf M'Neil, Esq. of Ballymorscanton, near Dundalk, (a gentleman who has cultivated it to the greatest perfection,) sowed one acre, from the leaves of which he fed forty pigs through the seasons of last summer and autumn; after which he saved 84 tons of roots, and upon these fed nine cows and five calves during the winter, and had upon the 22d April 1815, eight tons remaining, exclusive of one hundred of roots, which he transplanted for the purpose of preserving good seed. This circumstance is in itself considered sufficient, without bringing forward any more of the many proofs which could be adduced in its favour, to completely establish the usefulness of the Mangel Wurzel.

Culture.

Time of sowing, months of April and May.—Prepare a plot or field as for Turnips or Potatoes; open two drills with the plough, two feet apart, and put in a sufficient quantity of dung, according to the state of the ground; then cover the dung with the double mould-board plough at once, or the single plough at twice, by

ridging them up as high as can be well done, with a man shovelling between the drills, right and left, smoothing the surface of the dung, which will leave the ridge about a space of ten or twelve inches broad.

This complete method of fallowing, will repay the trouble of shovelling, by raising a full proportion of earth under the roots. When the ground is thus completely prepared, two boys or girls can sow from two to three acres per day. After sowing, it should be well rolled, which completes the whole process.

The crop is afterwards to be treated the same as turnips or potatoes, by putting to, and taking off, mould, &c. After the roots have been raised, the ground is in remarkably fine order for wheat, or any other crop.

I subjoin, for your complete satisfaction, the following letter to the editor of "*The Irish Farmers' Journal*."

"Sir, notwithstanding the multiplicity of communications respecting Mangel Wurtzel, for the last two months, I cannot resist sending you a statement of an intelligent practical man, corroborative of the wholesomeness of the plant, and instructive as to the use of the tops or stems, which some able agriculturists have hitherto considered of no value; whereas they have been applied by him as food for cattle, and have proved as efficacious in fattening, as either leaf or root.

"1813. I put in a very poor cow, and for some time fed her upon Mangel Wurtzel tops. When the frost came, she was fed with roots, of which she ate seven and a half stone per day, with eight pounds of hay. She was fat in three months from the time she got the roots. When put in, her value was seven pounds. She had eighty-one pounds of tallow, and never appeared, from

the day she was put in, to the day she left me, to have any disorder whatever.

“1814. I purchased four heifers, on the 17th of August, in very bad condition; put them on the second run of after grass; took them off the 10th of November following, and put them in stake on the tops of the Mangel Wurtzel, and about seven pounds of hay per day, during which time they improved very much. The first cost of the above heifers was twenty-four pounds; they were sold about the 12th of January, 1815, at forty-five pounds ten shillings, during which time, they never showed any symptoms of weakness, or disorder of any kind.

“I never knew the slightest appearance of any disorder, in any of the cattle, fed with either root or leaf, for beef or milk.

“I have at present eight bullocks and two cows, feeding with Mangel Wurtzel and turnips, with eight pounds of hay to each; on an average, they consume about five stone of Mangel Wurtzel, and six stone of turnips, each, per day, and are improving very much.

“I also got four pigs on the 2d of October, 1814, very thin; put them up, and fed them with Mangel Wurtzel root; and, for experiment, one day tried them with some raw potatoes, of which they would not taste, while the above root lasted. I killed one of them on the 29th of December, 1814, for pork, of which I would not wish for better, and well flavoured.

“JOHN LLOYD.

“*Steward to the Bishop of Derry.*

“*Dated this 20th January, 1815.*”

Alderney Cow.

*To Roberts Vaux, Esq. Secretary of the Philadelphia
Society for promoting Agriculture.*

I have upon my farm, on the Delaware, a cow of the Alderney breed, imported a short time since by Mr. Wurts. She had been fed in the usual manner, with potatoes; and, during the last week, the milk from her was kept separate, and yielded eight pounds of butter. The cow is a small animal, and is supported with less food than our ordinary stock.

By communicating this fact to the society, it will oblige, &c.

RICHARD MARIS.

January 11, 1817.

P. S. The cow is three years old.

The cow above referred to, is now in the possession of another member of the Agricultural Society; and, after a fair trial made with her during the last summer, (1817,) the superior richness of her milk, when compared with that of other cows, has been fully tested. She gave $9\frac{1}{2}$ pounds of extremely rich, highly coloured butter, per week.

The effects of the late season (1816) on the growth of grain, grasses and vegetables, in the neighbourhood of the city of Washington, and the country above and below it, connected with the navigation of the Potomac.

The coldness of the spring was such as to produce a general despair, as to all the winter grain crops, and diminish expectations, as to the spring grain, and all kinds of esculent plants.

This state of things continued till the end of May, when a plentiful fall of rain, and some warm weather, produced a most marvellous change; and though very little rain fell afterwards, during the whole summer, the crops of winter grain, at harvest, proved more productive than for some years before. The crops of timothy hay also, on meadows which were rich, whether on low or high land, afforded an ordinary, and, in some instances, a superior yield.

The crops of oats were worse than ordinary: wheat lands, which were sowed in the spring with plaster, exhibited a great improvement in the crop, which, in some instances, was supposed to have been doubled, in others, to have received the addition of one-third.

Clover failed generally very much, from the effect of cold, combined with the want of moisture, probably more from the former, than the latter. In fact, the second growth was generally very small. Indian corn, in ordinary lands, was feeble all the summer, late in shooting, and,

from the want of heat, more than the want of moisture, was late in opening, and consequently more than half destroyed for the purpose of bread, by the frosts in October.

Buckwheat, from the long continued drought after harvest, was very unproductive. Spring barley, even on rich bottom lands, was also of small yield. Early garden vegetables succeeded very well, though late in coming to maturity, particularly cabbages, which had been planted in the previous autumn. The first crop of potatoes was very productive, and of good quality, in lands rich enough to bear them; and all esculent roots flourished well, except the Carolina, or sweet potato, which failed in a great degree, almost universally. The latter crop of Irish potatoes was very much reduced in yield by the want of rain after harvest; otherwise, the quality of the ordinary standard.

Melon vines, of every kind, failed much in quantity and quality, from the cold more than the want of rain. The water melon was very inferior in size and quality. The pumpkin, cucumber and squash were also very unproductive.

As to fruit, the garden grapes were fine and productive. The early appearance of apples, promised abundance, but the excessive latter drought diminished their size, and caused many to fall. Peaches were generally fewer in quantity, and inferior in size and flavour.

On the west side of the blue mountains, the limestone soil being of a warmer nature than the soil on the east side of the same mountains, the want of heat in the atmosphere did not produce such injurious effects in the growth of corn; and the crops in that country may be consider-

ed as maintaining an average. Even on this side of the blue mountains, in rich moist bottom lands, in some instances, the corn has produced abundantly; but these instances are few. At present, (December 1,) from the continuance of mild moist weather, since the frosts in October, in rich clover lands especially, and in timothy meadows, the growth of grass furnishes a better bite to stock, than during all the summer.

From these observations it results, that the past summer was too cold for corn, for the Indian pea, for the field bean, for melons, pumpkins, squashes, cucumbers, and tomatas, which were injured more from the coldness of the season than from drought. The same observation applies to the sweet potato. It also results, that there was sufficient heat in the atmosphere for wheat and winter grains; a little more moisture would have added to the crop, which is proved from the great effect of plaster, in cases in which it was used.

The spring grains and clover grass required more moisture and more heat. Timothy, of all the grasses, seems to have met the trials of the season with least injury.

Irish potatoes, (except the latter crop,) and all esculent roots, seem to have flourished well, as did cabbages, both of the early and later growths. Turnips, in lands well prepared and suited to their growth, in all cases in which they were not at an early stage destroyed by the fly and the drought, have succeeded well.

The forest trees, both this and the last season, were injured very much by a caterpillar, which appeared in May, or the beginning of June, by destroying the foliage. Many trees died from the effect of this injury. Lands which had lain out in clover, or other grass, and planted

in the spring in corn, abounded in such numbers of cut worms, as to destroy the first plantation of corn. This effect was not observed to an injurious extent, in lands cultivated the previous summer,* or broke up during the previous fall and winter.

Some supplemental notes, with the writer's name, will soon be forwarded.

* This has been repeatedly observed when the culture was good; so as to leave no grass or weeds for the grub moth to deposit its eggs on.

R. P.

✂ The Society, in former volumes, have not published anonymous communications, however valuable they may have been; deeming the writers alone responsible. The expectation held out in the last paragraph, has induced an exception to the rule.

American Ploughs.

*Extract from "Evans & Ruffy's Farmers' Journal,"
(London,) November 20, 1815. Trial of New Ploughs.*

"On Thursday, the 9th instant, some ploughs, on a new construction, were tried at Bury Hill, near Dorking, the seat of Robert Barclay, Esq. a member of the Board of Agriculture, and a very zealous, liberal, and indefatigable encourager and promoter of every thing that tends to facilitate labour, to decrease expense, and to advance the interests of husbandry. Two of these ploughs had been sent to him from America, by Judge Peters, president of the Agricultural Society of Philadelphia.

"The other new plough was that invented by Mr. William Cooke, of Greenwich, and often advertised in this paper.

"Though the day was unfavourable, a number of the neighbouring gentlemen, and many practical farmers attended. The ploughs were tried in a wheat stubble, a rather free loam, but very much encumbered with couch and weeds; in a wheat stubble of stiff ground, but unobstructed by weeds; and in a light sandy soil: they were alternately drawn by two horses each, and then by four oxen; the weight of draught was taken by the instrument invented for that purpose; they were set at different depths; and their powers of operation tried in every way that was suggested. When the acknowledged awkwardness with which every new implement is at first handled, is considered, the facility and correctness that

the men showed in managing these ploughs, was a convincing proof of their simplicity : in fact, there is nothing complex about them, and there is one other essential quality, common both to the American ploughs, and to Mr. Cooke's, they move every particle of the soil, clear out the furrow, and leave the bottom perfectly level. The whole of the ploughing was witnessed by those present with feelings of pleasure and satisfaction, and the result of their opinion was, that one especially, of the American ploughs was, for free and mellow soils, a most valuable implement, of easy draught and effective operation, equal to any, and superior to many in present use ; but that in foul grounds, it could not fully clear itself, and was not sufficiently powerful for very heavy soils. —That Mr. Cooke's plough, was at least equal to it in operation, in soils where the American plough performed well, and was superior to it, or perhaps to any other, in very heavy and very foul grounds, where it buries the surface completely, and leaves a most perfect seam. It is an implement of very uncommon merit ; and the peculiar quality of it seems to be its fitness for any soil, from the lightest to the heaviest. A gentleman present, said he had tried it on his farm, in Middlesex, and particularly on a head-land, which had been much carted on, and where his own heavy plough, with four horses, could make no impression, while Mr. Cooke's, with three horses, turned it up completely ; but many farmers present doubted its powers where stones are embedded in the soil. This remains to be tried, and Mr. Cooke is ready and anxious for the trial."

Cole seed, Tares, Mangel Wurtzel.

*Extract of a letter from R. Barclay, dated Southwark,
15th April, 1815, to R. Peters.*

“I mean to adopt the plan lately introduced, to raise two grain crops by sowing Cole seed and turnips directly after clearing my tares,* which will be fit for use in September, when the land may be prepared for wheat. In one of my letters, I reported my having obtained from Flanders, last spring, a few seed of a new variety of Mangel Wurtzel, being of a deep orange colour, not before grown or seen with us, of which I had many fine plants, from six to eighteen pounds. The roots are now planted again, to preserve the seed amongst us, of which I hope to send you a sample of the seed of this year, as by an experiment it has been proved to be more saccharine than the common red, or rather rose colour which Mr. Davy esteems much beyond the white.”

“I wrote you that I have two stables of fat oxen now ready for sale, of the Scots Galloway breed, from ninety to a hundred stone, (of eight pounds,) which is the size most preferred in town, of which, five oxen were fattened solely by Mangel Wurtzel and hay, with complete success; the other fifteen on linseed and bran, crushed between iron rollers, which fully answers our expectation, and is highly economical.”

* Vetches,—*vicia sativa*, Lin. See Gleanings of Husbandry,
Art. Vetch. *Note by a Member.*

American Ploughs.

*Extract of a letter from the same to the same, dated
Bury Hill, November 20, 1815.*

“On an experiment made the end of August, by some of my agricultural friends, near Branfford, Middlesex, against a four horse plough of that county, I had the satisfaction to find one of your ploughs, with two horses, did the work quite as well, and as easy ; and it was then agreed, that in light land your plough answered excellently, particularly as it cleared the furrow so true and smooth, which we all know to be one of the first qualities. Wishing to make a further experiment, on this farm, I had the ploughs brought from town, and tried two of them with much success, especially one which merited great praise, of which you will have a very ample account in the Farmers’ Journal of this month, by a gentleman who attended closely on the experiments, and the competition made between your plough and a new one of Mr. Cooke’s of Greenwich, which, in very strong soils, is deemed superior to any other plough known in these parts.”

These ploughs were made for Mr. Barclay, under my inspection. I combined the best principles and forms of our American ploughs, studying simplicity of construction, sedulously ; and with the view to my observations in the note, Vol. II. p. 144, 5. Improvements on our

ploughs have since been made ; and they far exceed (for our use) any English plough I have seen.* In England, the complexity of their ploughs is much out of date ; and they find the advantage of simplicity of construction. Many now do their work with fewer horses ; and use lines, as we do ; without unnecessary drivers, or the incumbrances of wheels, &c.

I sent to Mr. Barclay an American sithe and cradle, which, with his usual zeal and liberal attention, he caused to be fairly tested in his harvest field. It was worked by an American cradler, against an Hainault sithe in an expert hand. It proved far superior in every respect, but that the Hainault sithe cut quite as clean, yet in no degree with equal celerity. I am in hopes this implement will become fashionable ; but it meets with the fate of all new instruments, especially in a country wherein labourers must be *humoured under present circumstances* : for Mr. Barclay writes to me, (after eulogizing the sithe and cradle with merited approbation,) “ I find our men all averse to its use ; as a new article ever meets with opposition from that class ; and though employ is become more general, yet I found any machine tending to lessen the wonted employ of harvest men, to be unpopular in the present crisis.”

R. PETERS.

* See my remarks on the trial of the ploughs sent to Mr. Barclay, in my letter, on the subject, to the society ; ante. I have made these remarks for the encouragement of our farmers ; and with no view to invidious comparisons. R. P.



*Account of trial of Towsley's Plough ; and culture of
Corn, Turnips, &c.*

Germantown, 12th Mo. 1816.

Esteemed Kinsman,

The plough committed to thy care by the Agricultural Society of Philadelphia, for trial, has been used, and thy request in part complied with, and the results I shall endeavour to communicate in as few words as may be.

First. The plough, as received, was tried in a meadow that has never been turned up, to the knowledge of the oldest inhabitant of our village.

The result exceeded my most sanguine expectation, turning a furrow superior to any I ever saw.

Second. On ploughing my late corn field, for oats and barley next spring, I found that the coulter of the plough not resting on the point of the share, was a manifest disadvantage, as the corn roots choked it ; however, by letting it down as low as it would admit, the complaint was in a great measure prevented. I would suggest the propriety of its being made so as to rest on the point of the share ; the coulter of the one now tried will not admit of it, being too short by six inches.

The result was, I never had the corn roots so well covered, and that they should so be, is, in my estimation, a very desirable thing.

The third experiment I intended making, has been retarded by the late severe frost. This will be in a sod not turned down these five years, and stony ground ; should

this succeed as well as the first and second, I have no hesitation in pronouncing it as my opinion, that Towsley and Co.'s plough is superior to any I have ever had used.

Whilst on the important subject of agriculture, I deem the present a suitable opportunity to communicate the result of my experience in the culture of corn and turnips, the first of which, from the frosts of this season, failed to an alarming extent, and suggest the propriety of an earlier attention in planting. I commenced this year on the 27th of the 4th month, (April,) but not having sufficient manure on the ground, for dunging in the hills, I stopped on the 30th, when five acres were done, and did not begin again until the 12th of the 5th month, (May,) and finished on the 15th; with this I had three ears, of the growth of the first planting; the whole five acres came to perfection, and was admitted by all my neighbours to be the best corn grown this season: the second planting was about half hard, the other in a milky state, when the frost took it, and not near as heavy a crop. From this, and the planting on the 25th of the 4th month, (April,) 1815, which was an excellent crop, I am led to believe that an erroneous idea is prevalent, that from the 10th to the 20th of the 5th month, (May,) is the proper time to plant. By my diary of daily occurrences, and state of the weather, I find that the corn planted on the 27th of the 4th month, (April,) was up on the 3d of the 5th month, (May,) on the 15th it was apparently killed by the frost of the night preceding, and the frosts of the 7th, 8th, and 9th of the 6th month, (June,) were so severe as to nip the blades of the whole field; on the morning of the 12th a fine shower fell, attended with thunder,

which so altered the corn, that in one week it overgrew all the blights it had received; the early planting grew much stronger, and was in tassel two weeks before the other. From these observations I am induced to believe, that although frosts are injurious to the growth of corn in the spring, yet they are not so bad as one in the beginning of the 9th month, (September,) when the grain is in a milky state, and which, by my early mode of planting, may in a great measure be prevented. My intention is, to plant on or about the 20th of the 4th month, (April,) next. Before closing this, I may observe that I have my ground, which has uniformly been a sod, ploughed in the fall, to prevent the cut-worm; it was a remarkable fact, that I did not lose one plant by the worm this season, whereas my next neighbour, the fence alone dividing us, lost nearly half of his. I could add much more to the foregoing communication, but will leave it, with a desire that some other person may make a trial of my small experience.

TURNIPS.

Turnips being a crop that will not pay, with us, without great economy in the raising of them, I have endeavoured to fall upon some plan that would be advantageous, with as little expense as possible. I now communicate the result of my experience for these three years past. About the last of the 7th month, (July,) I have a piece of old sod ploughed, and immediately rolled, then spread with good short stable manure, and well harrowed about the 10th of the 8th month, (August,) and then

sowed : when the leaves are about one inch long, I have them harrowed both ways, and then left, this being, in my opinion, as good as hoeing, and much more economical.

The result has uniformly been an excellent crop.

Affectionately,

ABRAHAM M. GARRIGUES.

REUBEN HAINES.

*Double furrow Plough.**The improved Draveil double furrow Plough.**Communicated by Mr. James Eastburn.*

(See Plate of the Draveil Plough, Vol. II. page 140.)

The improvements which have been made upon the Draveil double furrow plough, mentioned in the second volume of the "Memoirs of the Philadelphia Society for promoting Agriculture," have, it is conceived, by simplifying its construction, rendered it applicable to common use in our country, in lands clear of rocks and stumps. The inventor of these improvements has also constructed mould boards, suitable to these ploughs, upon an improved plan, which are intended to be of cast iron, and which, by diminishing resistance, will render them, when of small size, easy to be worked by two middle sized mules or horses, in cultivating corn or seeding wheat. With this force, a gentleman of Maryland has used these ploughs, of the size now exhibited, in working corn and seeding wheat. The rows of his corn are four and a half feet apart. With his double furrow plough, drawn by two middling sized mules, he works his corn completely, by a single bout between the rows; whereas two, and sometimes three, were necessary with the common single plough. His ploughmen put in four bushels of wheat, sown at the rate of one bushel and a peck per acre, a day each, instead of two, which is the ordinary task for a common seed plough, which he has laid aside altogether, except for the purpose of laying off the lands or beds for sowing. He works his corn after planting, and seeds his

wheat with half the number of ploughmen and mules, which he used, before he adopted the improved Draveil double furrow plough. His lands are free from large stones and stumps, and part of them are hilly, and part nearly level, in both of which kinds of land he has used it, and found it to answer perfectly. His experience proves the utility of this improved plough, and that it surpasses the expectations of general Armstrong, (who first transmitted to this country, from France, the drawings of the original Draveil plough, to the honourable Richard Peters, of Pennsylvania,) which limited its use to light and level lands.

The improver of this plough, after throwing away the wheels and complicated fore beam of the original French plough, found it necessary, in order to make the furrows of the same depth, to turn the point of the hinder share a little above the level of the fore share. If this be not properly attended to by the maker of the plough, the defect may be easily remedied by the ploughman, by raising the fore beam, by means of a wedge driven between the beam and the shoulder, if the fore share runs too shallow, and the hind share runs the proper depth. If, on the contrary, the fore share runs the proper depth, and the hinder share too deep, the point of the latter must be raised, by shortening the shoulder of the hinder plough. When the balance is thus properly established, the clevass will regulate the depth of this, as it does that of the ordinary plough. As there is a strong tendency in this plough towards the land, it is proper, in making it, not to turn the shares at all to the land, and to give the fore beam a bend towards the land. Should this not be sufficient, the clevass will supply the defect.

A three or four furrow plough may be constructed upon the same principle with the double furrow plough, but a plough carrying more than two furrows, is more liable to accidents, and rather unwieldy, especially at the turning.

This plough, it is believed, must become extremely useful in working all sorts of soils, after they are once broken up, and to break up light or sandy soils. But to break up stiff lands, it is apprehended it would take a greater number of horses, than could be managed by the ploughman with convenience. As to working corn and seeding wheat, a fair experiment, for a whole season, upon a pretty large scale, by the gentleman above alluded to, has proved its great utility beyond a doubt, by enabling him to dispense with one-half of his ploughmen and mules for these purposes.

 A working model, of the improved plough, may be seen in the ware-room of the society.

*On Muck and Fresh Stable Manure, by E. G. Passmore,
of Delaware County, Pennsylvania.*

Edgmont, 1st mo. 18th, 1816.

Esteemed friend,

Having read an essay in the third volume of the Memoirs of the Agricultural Society, page 221, upon the subject of hot muck and rotten dung, in which there are some objections advanced against the use of hot muck, opposed to the result of applications that have passed under my observation, and as the management and best application of manure is a subject of primary importance to the agricultural interest, I shall take the liberty of stating my sentiments upon it, for your service.

Though vegetables are capable of deriving their support from elementary principles, yet, as by a wise economy in the laws of nature, the source of vegetable production is replenished, by the dissolution of the production, it is reasonable to conclude, (and facts support the deduction) that the elements that have once formed a living fibre, are, by the natural decomposition of that fibre, placed in a situation more capable of entering into the composition of a new race of living fibres, than the same elements obtained from other sources. If the decomposition be effected by combustion, the elements are converted into the same state that they can be obtained from other materials: when effected by fermentation, the

more violent it is, the nearer it approaches, in its effects, to actual combustion. Carbon, both soluble and insoluble, is a component part of all vegetables; facts, familiar to practical farmers, support the conclusion, that soluble carbon is much the most efficacious. By a slow process of fermentation, the soluble is gradually detached from the woody fibre, and held in solution in the water: but when the decomposition is more rapid, (as will always be more or less the case, when it is effected in a mass,) there is a large quantity of carbonic acid gass formed: as the water is capable of holding but a small portion of it, the rest, rendered buoyant by the heat, must rise into the atmosphere, where every breeze (and not the exhaling powers of the sun) must bear it away: was not this the case, there would, excluding water, be but little difference between the weight of the materials, before and after fermentation; but the loss in virtue is much more than proportionate to the loss in weight; for it is well known, that in proportion as vegetables approach the state of woody fibre, they are difficult of decomposition. Fermentation must therefore commence on those parts containing soluble carbon: the greater part of this loss was in soluble carbon, that would never have been converted into carbonic acid gass, had the raw materials been committed to the soil. Every application, that has passed under my observation, has gone to corroborate these sentiments. I have rotted dung in covered repositories, both in a large and small quantity, conducting the fermentation by compression and irrigation, in the best manner that I was capable of conceiving and effecting; applied it and muck, as voided from the stable, in quan-

tities as nearly equal as could be estimated ; and the result has shown the inferiority of rotted dung.

The urine and moisture of the alvine ejections are powerful promoters of fermentation. When the materials are thinly placed in the soil, and thus deprived of the assistance derived from volume, the other auxiliary is necessary, in order to promote a speedy return, so advantageous in every investment of capital. I therefore highly approve of covered repositories : but I would have them open on all sides, and situated in such a part of the fold-yard, that their contents should be most exposed to the treading of cattle ; thus as much as possible preventing fermentations taking place.

Among the objections and analogous illustrations advanced by R. Peters, I think the following worthy of notice ; because they are calculated to carry conviction to minds but little disposed to reflection, or that are incapable of drawing their conclusions from an examination of principles. Of this latter class, (from defects in education) is a large portion of our very respectable body of farmers.

“ The violent fermentations preparatory to the art of making bread,” and “ fermented and baked provender is more nutritious,” &c.

In the fermentation of bread, a portion of the starch is converted into sugar. It is generally believed, that that arrangement of elementary principles, forming sugar, is more nutritive than any other produced by vegetation or vegetable decomposition. Were “ we to venture to recommend this process to be carried on in the stomach,” it would not take place in a healthy animal ; but the de-

composition of muck does not take place when committed to the earth. His "fanciful" conclusion, therefore, that "fermentation in the stercorary is as essential to the preparation of food for plants, as fermentation in the dough-trough is to making bread," is incorrect.

"That it produces, in grain crops, smut, blight, and mildew, or loss by laying of over-abundant straw." By smut or blight, I have never seen a crop much injured: but I see no reason why it should produce such an effect, unless from the application of an excessive quantity. Mildew is well known to attack those plants that are protracted in their ripening, either from being weak or growing in a low and deep soil. A few loads of muck have been applied, every year, on the farm upon which my observations have been made; and I have uniformly observed, that the grain there was first ripe, unless put on a part least favourable to early maturity. In one instance, I particularly remember, (though, from the sparing manner in which it was applied, there was but little difference in the quantity of straw) there was rather better than a week difference in the time of its shooting into head. As to "laying," that, I think, must be charged to the farmer, for applying an excessive quantity. If he is more apt to commit this error with muck than rotten dung, is it not a proof of its superior efficacy?

"That it affects the ground with a durably deleterious taint." I know of no principle upon which this can be produced; but, on the contrary, I have observed, that where it was applied, green grass, (*poa viridis*) has almost uniformly followed. I cannot admit the position, that

"It is incontestably true, that dung operating with violence is much shorter of duration." This violence of

operation is produced by that part of the manure that is dissipated in the atmosphere. When the fermentation is effected in a mass, it is capable of producing the same effect after, that the other can. It can do no more ; for the strength of grass roots, which it promotes, acts upon the principles of compound interest. I have seen the superiority strikingly evident in the second course of grass, when no manure was applied to the intervening grain crop.

I believe, with R. P. that exposing the raw material upon the top of the ground is without reasonable excuse ; because it is exposing it to the influence of casualties and the loss of a protracted return. But I believe it very possible for all the advantage to be derived from manure or muck spread in this way, that can from any other mode of application ; but it is better applied to grass than grain ; because it will form a thicker covering, to prevent the sun exhaling, not its virtues, but moisture, one of the essentials of fermentation, which, being slow, does not produce heat sufficient to raise the carbonic acid from the ground. If rains, occurring during this process, should be gentle, both that and the soluble carbon will be soaked into the earth : but should they be heavy, a large portion of both must inevitably be washed away.* But, as

* Any quantity of manure, applied in the rotation of crops to the artificial grasses, at the time the seed is sown, will do more for that course of grass than twice the quantity applied next year, such is the advantage of a healthy, vigorous seedling plant. Were I to lay down a piece of ground for the natural grasses, to obtain the best of which, green grass, a rich soil or top dressing is necessary, if the earth, which I yearly lay over the fold-yard, was not sufficient, I would rather spread the "raw material," subject-

a grain crop affords inadequate shelter, the materials must often be dry, and decomposition at a stand, so as to afford but little assistance to that crop, this has generally been more or less the case, where I have observed such an application.

“The stercorary is to the farmer, what his dam is to the miller,” and “fermentation” (in the stercorary, I suppose) is as essential to the farmer as to the brewer or distiller.”

The miller wants his dam to produce a power adequate to the effect. The farmer does not want the stercorary for that purpose : for decomposition will take place without the aid of quantity.

The brewer and distiller want a new arrangement of the elementary principles of vegetables : this is the result of a loss of part of the carbon ; and is best effected by promoting the fermentation in a mass. The farmer wants an entire decomposition : his object is to save the carbon.

ing it to casualties attendant, than to the known and inevitable loss by fermentation in a mass. I believe that the opinions entertained by some men, in favour of covered repositories for dung, have resulted from ascribing effects to a wrong cause. They have witnessed the great difference in effect, produced by a few loads, drawn immediately from the stable, and the same kind when rotted : they have considered this difference was all produced by the latter having been wet ; but the real cause was the animal produce of the stable promoting a speedy fermentation of materials, not before fermented. When applied to ground laid down with artificial grasses, it is the influence of this speedy return in promoting vigorous seedling plants, and the decomposition of their roots, when returned to the plough, that forms the difference in effect between that and dry hay straw. But for the influence of that cause, it would be less valuable, in proportion to the dressings it contained, as that quantity is less valuable by all that it takes to support the life of the beast, and add flesh to his bones.

All other things being equal, this will be effected in inverse ratio to the mass.

“Arator, aware of the necessity of meeting his fermenting muck with a powerful plant, his Indian corn stands the brunt of the battle.” I should rather suppose he applied his muck to that crop, because it was the only one which he put in, in the spring; also, because it is more easily covered by a sward. I covered about two-thirds of a five acre lot, last year, with muck drawn from such a stercoreary as above described, and planted it with corn. There was not so much rain as to wet through the dust. From the 9th of the 7th, till near the close of the 8th month, on the part dunged, I could not, at any time, find a shrivelled leaf; yet, in other parts, this was not the case, though the whole suffered much less than any other in the neighbourhood, which I principally attribute to the minute state of subdivision to which the surface soil was brought, by frequent hoe-harrowing. The corn, alluded to above, was on a piece of ground facing the north. The whole lot was much injured by the cut-worms, in the spring; near an acre was almost entirely destroyed; on a part of that not dunged, the corn was quite ordinary: yet, notwithstanding these drawbacks, it averaged eighty bushels to the acre. Therefore, the part dunged, that suffered least from the worms, must have had considerably above an hundred bushels to the acre, though the part dunged was not previously in a state of cultivation that would produce even a middling crop of grass.

As to the fact mentioned in the close of his postscript,*

* The fact, I mentioned from memory, will be found more minutely, but substantially alike, related in the *Museum Rusti-*

I conceive it must have resulted from a deficiency of crops admitting of cultivation while growing ; for, unless we admit of equivocal generation, we must suppose, that when the seed vegetates, and the young plant is destroyed by the cultivation of the crop, all danger from that quarter is at an end. The farmer, who composted, exposed his seed to vegetate on a small scale, where in a short time he could destroy those that had vegetated, and expose a fresh parcel ; from that cause he might succeed, under the same course that the other failed : he might have succeeded equally well, by introducing more fallow crops, and had a year's advance and increase in crop, to have balanced the account of labour. I very much doubt whether the vegetative power of weed-seeds is destroyed by fermentation of a muck heap, unless it proceeds to height amounting almost to actual combustion ; for the embryo principle of life resists the efforts of decomposition, in most seeds, that contain but a small quantity of farinaceous matter. Most weed-seeds are of this description. In many, the vegetative power is assisted.

That fermentation of muck in a heap must be productive of great loss, every observer of nature, in her mode of preparing food for plants, might have supposed ; every farmer might have adopted the same assumption, from the smell of his muck heap : but it is science, by teach-

cum, Vol. V. p. 104. The successful farmer prospered by change of crops, and invariably composting and rotting his dung. *Smut* was uniformly the chief destroyer of his predecessor's crops ;—of wheat particularly : but it never revisited the fields manured with composted dung, after having been cleansed by *tares*, *vetches*, and other fallow crops.

R. P.

ing us the principles of vegetables, that has enabled us to submit it to demonstrative, and therefore satisfactory proof: nor has any application that I have made led me to conclude, that this “inevitable loss was, in profitable result, a gain.” Among many, I will particularize the result of one application upon a poor washed piece of land, where but a few solitary roots of grass would grow, and where a return of the seed of wheat could not have been expected from the most favourable season. It was applied at the rate of about twenty cart-loads to the acre. The smell of ammonia was penetrating: the wheat grew so thick, that it actually moulded as high as the third joint, before it lodged; but it was better filled than ever I witnessed of an equal quantity of straw on any ground, and far superior to any other part of the field, where there was nearly an equal quantity of straw. I was under the necessity of cutting it four days sooner than the rest would do, that was manured with rotted dung. The farmer that applies his muck before fermentation, is able to cover nearly twice the quantity of land, with equal effect. The difference in result of the two systems, therefore, will stand somewhat thus:—Two men have equal sums at interest; the one takes up his interest when due, applies it in some business, by which he gains one hundred per cent. per annum; to this doubled sum he adds the next year’s interest, for a new capital, to embark in the same trade; while the other lets it lay in the hands of his debtor.

Let me impress it upon the mind of every farmer, that loss by warming rains, or exhalation, is not the greatest foe he has to contend with. The existence of the latter, in sensible quantities, is even doubtful: the former may be arrested by a layer of earth under the muck, and a

basin situated in a convenient place, to receive what drains away. But it is the decomposing efforts of fermentation, by converting the materials into an elastic fluid, that bids defiance to the practical provisions of art to prevent its escape, in the presence of the heat produced by a fermenting mass.

Note to the communication on Hot Muck, &c.

I receive with pleasure any correction of errors I may commit in theories of any kind ; and particularly on a subject so important to tillage crops as that observed upon in the foregoing essay. But both the writer and myself will find that theories do little towards conviction, in operations wherein practice is the surest guide. My *theories*, in his opinion, are inapplicable ; and short of proving the points I aimed to establish : and so, for aught I know to the contrary, some of them may be ; and if so, they show the impolicy of giving too many reasons, when one or a few would be sufficient. Practical proof, too, supersedes the necessity of abstract discussion. But still my experience warrants my decided disapprobation of the use of hot muck. I have no personal object to gain ; and, desiring that truth may prevail, by an elucidation bestowed on it by a series of facts, I consider myself as having done some service in producing discussion. I have been a practical farmer, with more or less activity and personal attention to it, (accordingly as my other engagements permitted) for the greatest portion of my life. The account I gave is founded on numerous facts, which, through a long course of time, fixed my opinion, and directed my practice. Had I kept a journal of every experiment I have made and seen on this subject, I could have furnished perhaps stronger proof of accidental or rare success, with hot and unrotted dung, than I have perceived in the few instances related by the writer, and others who disagree with me. But safe practice must be warranted by the balance of many facts. In some instances, with me, the earth surrounding the covered dung

or muck ploughed in, has checked the fermentation; and the wetted straw has neither fermented nor rotted. Unless the mass be reasonably rotted, it is impossible to spread it, so that the animal matter can be equally distributed. It will lie in lumps or aggregations of dung, which will ferment (especially if applied to summer crops) in a hot and dry season, violently; whilst the strawy parts are little affected. Your crop will grow uneven, and bunchy in spots which will fall. And thus I have, in numerous instances, far overbalancing those to the contrary, found the fact to be. The mischiefs attending it have passed under my frequent observation. The account of the rationale of mildews, smut, &c. given in our second volume, page 160, &c. agrees with my frequent experience. The hot dung, or indeed any stimulating manure, promotes, in warm days, rapid and overabundant circulation of sap, which, being extravasated and checked by chilly nights, coagulates, feculates, and rots. Insects I have seen in countless numbers on such extravasated sap. Low or damp situations are most adapted to chill and check the circulation, and in them mildews are therefore more frequent; but they are not exclusively subject to them. Those who *soil*, and for that purpose cut their grass and weeds before maturity of the seed, or apply their muck in drill crops, kept clean by frequent hoeing or harrowing, have the best chance of success against the growth of weeds, and possibly on other accounts. I am in hopes, that, if (although unintentionally on my part) I rouse up antagonists to my practice; be their motives what they may; or set to work candid and intelligent inquirers; some settled results will be established, on a subject on which differences both of opinion and practice have existed, as long as my memory enables me to recollect. If this be the consequence, I shall be gratified, be those results either favourable or contradictory to my individual opinion or experience. Farmers of wet clay soils will be the most successful with hot muck; especially if they copy *Mr. Gregg's* practice, as related in a note in our second volume, pages 71, 72. But, in his essay on the subject, I find his dung undergoes a reasonable fermentation before it is applied.

Anxious only for practical truth, and never contending for victory in opinion, I am not disposed to enter into controversy

on any agricultural subject, and especially on theories. Such disputes do no service; and tend to prevent the great mass of farmers from meddling with a litigated topic. I shall therefore forbear any animadversions on Mr. P.'s remarks on my endeavours to elucidate my opinions; unsuccessful as to him, and most probably with others who deem stercoraries useless; and, indeed, if they are right, mischievous. Much less shall I incline to discuss the *modus operandi* of dung, or other manures. In such discussions, men of more intelligence than either of us have failed. Nor do I pretend confidently to account for the causes of *mildew*, *smut*, or other diseases in grain. I continue to hold covered stercoraries, and compound dung-hills, in high estimation. If this be an error, I am *now* so incorrigible, (yet, I trust, open to future conviction,) that I willingly join in opinion with very many experienced agricultors, that directly applying fresh unfermented stable dung to crops, is a lamentable and wasteful misapplication of a powerful raw material; invaluable for its capacity to impregnate and elaborate earths, and putrescible and other substances: thereby adding a manifold increase to the stock of manure; by rendering other materials highly fertilizing; which would, of themselves, have been inert, inoperative, and worthless. R. PETERS.

February 25, 1816.

Mode of cultivating Indian Corn. Harrows.
By R. K. Meade, of Virginia.

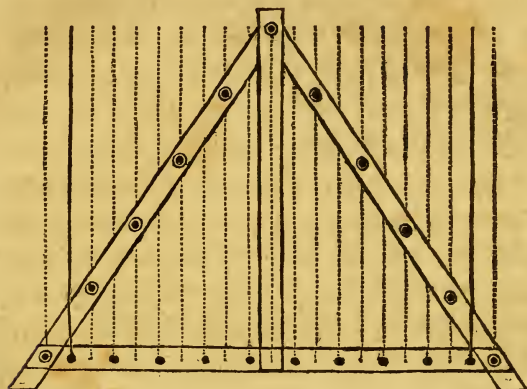
Lucky Hit, May 28th, 1816.

Dear Sir,

The plaster is working miracles in our limestone soil. A next neighbour of mine, whose veracity I can vouch for, has, with the aid, he says, of fifteen bushels of plaster, cleared four hundred dollars from fifteen acres of land. He put, late in the spring, fifteen bushels of plaster on fifteen acres of clover, and got but a very moderate crop of hay, there being a great drought. He thinks it will pay him for all the expense of plaster, cutting, and getting out forty bushels of clover seed, at ten dollars per bushel, which he actually sold. This neighbour of mine, John Kerfoot, has been in the habit, generally, of having better wheat than myself; and I cannot account for it, if it be not from this circumstance. He pulverizes well, after a deep ploughing, sometimes two ploughings, sowing from three to five pecks of wheat per acre, doubly harrowing it in, with light harrows, very shallow. I prepare my ground in the same way, sow from four to six pecks per acre, and put it in with heavy, sharp harrows, well weighted, so that the grain has been put to a considerable depth. His grain uniformly looks thicker than mine. I intend, this fall, to roll in a small spot of wheat; last fall I smoothed off, with a small harrow, thirty-two

rows in my corn field, where the wheat had been ploughed in with a Dutch shovel ;—it has uniformly looked better than the rough ploughing, and will turn out, I think, considerably more. I shall tire you out with my desultory remarks ; will conclude, then, with the harrow. My father was in the habit of using a variety of instruments, similar to those you describe in your last letter, but our country was not then sufficiently clear of stumps and rocks, nor is it now, to work complicated instruments to advantage. To put in as much as we could, during the season, has been our general aim ; paying but little regard to the mode of cultivation, or the improvement of the soil. My practice, in some measure, and my ideas, agree with your mode of corn cultivation, though, with my neighbours, I have been in the habit of planting my corn in half prepared land, and mangling the young corn to cultivate the balance ; but I have done with it ; an experiment this spring has confirmed me. I cultivate two thirty acre fields in corn, both set in blue grass and clover, the one I harrowed down with a heavy harrow, with three horses, only once, the other I harrowed and cross harrowed, with the same harrow, but loaded, and drawn by four horses, which put it in fine order. This, the last planted field, has met with a trifling interruption from the worm, while the other has been much injured, and required a great deal of re-planting. The first requires a great deal of cultivation ; the other will wait more than a month after the corn is put in the ground. I put a handful of ashes, with plaster, in each hill, as do a great many farmers around me, in imitation of Farrow, who made a great crop in that way, though the proportion of plaster was greater with him.

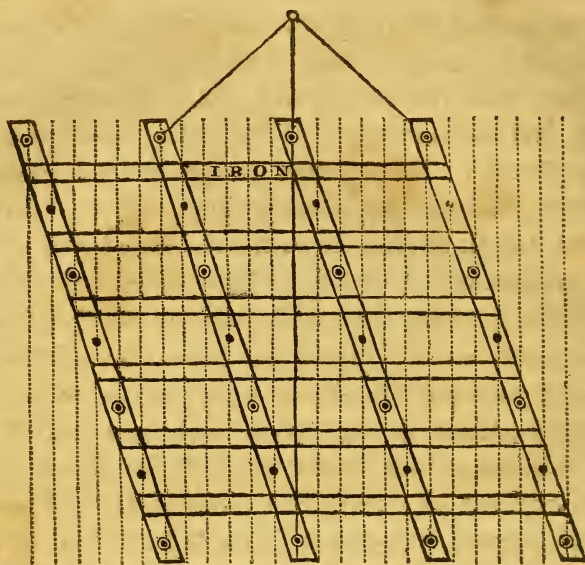
This equilateral triangle is preferable to the diamond harrow, in stumpy or rocky land ; I give a preference to the other, in perfectly arable land.



Nine or ten inches long
flat diagonal tooth, with
sharp steel edges.

The triangle harrows six feet of ground. It is used in the first place as a breaking down harrow, and employs for that purpose eleven teeth, which occupy the two sides of the triangle, and divide the ground, within a fraction, into seven inch spaces. The teeth are so long and sharp as to cut through a sod, or penetrate stiff ground, with a competent weight on the harrow, which four horses can easily draw. The distance of the teeth from each other is so great as to prevent its ever choaking. The teeth, being keyed in above, may be easily removed, and turned round, to use the other sharp edge ; for the teeth are flatted, and taper gradually from the under part of the harrow timber to the point, so that the strength of the tooth is fore and aft ; a blacksmith's bill is saved by the economy of turning the tooth. The usual way of putting in harrow teeth is from the top of the harrow, barbing the teeth well, to make them hold,

thereby tearing the wood work to pieces, when you take them out to sharpen; then wedging and splitting the timbers, when you put them in again; thence to loosing teeth, and half-harrowing—Virginian style—Is it so in Pennsylvania? These teeth are gradually shouldered up from the under part of the timber to the top, burnt in, so that they fit as close as wax, and, when keyed above, cannot come out or move. These holes, being burnt exactly of the same size, will admit any change of shape to the tooth below. Now, this same stock, which, if made of good timber, will last a generation, and will receive the addition of ten teeth behind, to divide the seven inch spaces into three and a half, for harrowing in grain, or a full set, twenty-one, short teeth, and square, to put in grain, will answer in the place of two. This harrow, I think, will be free from choaking, (the general objection to them) for the last mentioned ten teeth, being all behind, are seven inches apart.



It ought to have been cut off at the lower line, to make it square six feet.

This harrow is intended to answer the double purpose of harrowing down, and putting in ; goes over eight feet of ground, and divides into seven and three and a half inch spaces. The front bar or slab of iron will be effectual in drawing up stumps, and defending the rest of the harrow. I have worked one of this sort several years, with four oxen, with the teeth too close for a breaking down harrow. It is not laid off mathematically ; but will serve to give you an idea of the plan. It is, to be sure, a common one, with some addition, which you will have the opportunity of saying, whether or no is an amendment.

Believe me, dear sir,

With great regard and respect,

R. K. MEADE.

Stunt and Black Grub.

One of our correspondents, (S. Preston, Esq.) whose communication, *in extenso*, is, from necessity, omitted; informs of his having observed the *stunt* in *timothy grass*, as well as in *wheat*. He mentions a fact of his own knowledge, having repeatedly practised it, that firing a musket near the ground, over garden beds infested by the black grub, which annoy and cut off cabbage and other plants, will kill them, by the concussion in the air, or some cause producing the effect. It seems they are migratory, like the corn grub; and those not killed may remove to some other scene of depredation. How to account for this fact, or how to improve it to more important purposes, must be left to philosophers, and other savans. We barely state it, as communicated. Dead birds, insects, &c. are frequently found after thunder storms; and it is not uncommon for dead bodies of persons drowned, dead fish, &c. to be raised and discovered floating on the surface of rivers and other deep waters, after severe thunder; and even after heavy cannon having been fired. When the British fleet and army occupied New York, during the war of the revolution, the frequent firing of cannon either banished or destroyed the *lobsters*, which had been plenty in the bay and waters at and near that city. They returned, gradually, after the peace; but are said not to be now in such plenty as they had been in early times. Other causes may have contributed to the latter circumstance. A violent blow or concussion on the ice, when rivers, or other large streams, or dams, are frozen over, will torpify or kill fish, so that they have been taken, thus stunned, out of air-holes, or those cut through the ice for the purpose.

Communications, in consequence of the request of the Society, on the circumstances attending the season of 1816.

The following Resolution of the Society was promulgated by the curators; and many of our agricultural fellow-citizens were so obliging as to communicate information. The matter for our volume has increased so far beyond our expectations, that we are compelled to omit some communications partially, and others entirely, merely for want of room in our volume; and by no means from inclination to give preferences to any of our valuable correspondents.

“At a Special Meeting of “*The Philadelphia Society for promoting Agriculture*,” held October (10th mo.) 30th, 1816.

It was resolved, unanimously,

That the Curators, with the assistance of the Secretary and Assistant Secretary, and any other Member or Members of the Society, who will procure and give information, collect facts relating to Agriculture and Horticulture, and of all circumstances connected therewith, which have occurred through the extraordinary season of 1816; and particularly the effects of Frost on vegetation, so far as it shall be in their power to acquire a knowledge of them. In performing this useful service,

they will designate the Trees, Grasses, and other Plants, and especially those cultivated, on which the Season has had either beneficial or injurious influence, and the local situations in which it has operated more or less perniciously, with the view to ascertain (among other beneficial results) the hardy or tender Grains, Grasses, or Plants, most proper for situations exposed to droughts, wet, or frost. In their inquiries, they will endeavour to discover the stages of growth in which cultivated crops have been more or less affected, and the state of products both of Grains, Grasses, and Fruit. The addition of any facts, as to insects and vermin usually or occasionally preying on cultivated plants, and whether more or less injury has been done by them in this, than in ordinary seasons, would also be useful. The result of such inquiries to be drawn into the form of a report, to be made by the Curators at our annual Meeting in January next, subjoining such observations as they shall deem proper to furnish, not only with the view to present information, but to record, for future instruction, the uncommon occurrences, and the consequences attending them, which have marked this anomalous period.

Published by order of the Society.

RICHARD PETERS, *President.*

ROBERTS VAUX, *Secretary."*

Brunswick, (Maine) December 31, 1816.

My dear sir,

I recently observed, in the Repertory, a paper signed by yourself, requesting information, relative to the late *uncommon season*. Although your views were probably confined to Pennsylvania and the neighbouring states, I thought it might be interesting to you to see some account of the climate of this extreme part of the United States, more especially in those months in which vegetation takes place. I use a very accurate thermometer, with Fahrenheit's scale. It is suspended about six feet above the ground, and has a northern exposure.

TABLE I.

Showing the monthly mean temperature for the last seven years, in May, June, July, August, September, and October.

Months.	1810.	1811.	1812.	1813.	1814.	1815.	1816.
May.	55.3°	54.7°	49.5°	52.4°	55.4°	52.3°	50.5°
June.	63.6	63.8	60.8	61.8	62.7	64.2	58.8
July.	65.7	68.8	65.5	67.6	67.4	71.4	65.2
August.	66.4	67.2	64.4	68.8	64.6	65.7	66.1
September.	61.6	61.0	56.4	61.2	58.0		57.9
October.	48.1	49.2	47.7	48.5	50.1	46.8	49.9
Means.	60.1	60.8	57.4	60.0	59.7	60.1	58.0

TABLE II.

Showing the annual temperature, deduced from three observations each day, made at 7h. 30m. A. M., at 1 o'clock P. M., and 15m. after sunset: and also the annual temperature, deduced from the extremes of heat and cold, taken each day by a self-registering thermometer, exposed as above.

YEARS,	1810	1811	1812	1813	1814	1815	1816
From three observations each day,	45.3°	46.2°	42.6	44.9	45.1	44.5	43.8
From extremes of heat and cold,	42.5	44.2	39.7	41.9	40.9	42.0	41.5

Mean temperature of the year, for the last seven years, as deduced from three observations each day, 44.6°.

Mean temperature for the last seven years, as deduced from the extremes of heat and cold, each day, 41.9°.

TABLE III.

Showing the quantity of rain, and the coldest day in the preceding months, for seven years.

Month	1810.			1811.			1812.		
	Rain.	Gr. Cold.	Day of Month	Rain.	Gr. Cold.	Day of Month	Rain.	Gr. Cold.	Day of Month
	Inches			Inches.			Inches.		
May,	2.8	25.0°	7	4.3	24.0°	24	4.4	23.0°	16
June,	2.9	36.0	7	2.9	36.8	1	7.7	42.5	5
July,	3.0	44.0	15	5.0	40.5	1	5.0	43.0	2
Aug.	3.6	43.5	16	3.6	42.5	6	3.7	37.0	31
Sept'r.	1.4	32.5	17	0.5	33.3	22	1.0	27.8	29
Oct'r.	1.4	14.0	31	2.6	21.5	18	4.6	19.8	14
Inches.	15.1			18.9			26.4		
	1813.			1814.			1815.		
May,	2.7	21.5	4	11.4	31.5	3	1.8	24.5	2
June,	2.1	39.5	3	3.7	36.0	7	4.7	40.0	11
July,	2.7	43.0	11	3.6	39.0	13	1.5	41.5	5
Aug.	2.2	44.0	19	7.3	39.5	26	3.0	41.5	10
Sept'r.	0.7	37.5	27	5.1	31.5	6	4.2	32.0	
Oct'r.	1.6	16.0	22	0.6	17.0	25	1.2	19.7	31
Inches.	12.0			31.7			16.4		
	1816.			This table will enable you to form some idea of our exposure to <i>late</i> frosts in spring, and <i>early</i> frosts in autumn. When my thermometer, <i>suspended as before mentioned</i> , falls to 36°, I					
May,	4.1	25.0	15						
June,	1.4	30.0	10						
July,	1.6	33.5	9						
Aug.	2.1	41.7	29						
Sept'r.	0.3	25.5	28						
Oct'r.	6.1	23.5	5						
Inches.	15.6								

Of the seven last years, 1812 and 1816 have been very unfavourable to vegetation. The average temperature of 1812, during the aforementioned months, was a little less than in 1816; but the season was much *more wet*.

The extremes of cold, the last year, have been very great. In June, the thermometer fell below 36 degrees, on four different days.

My observations on the effect of the last season on different vegetables, have been very limited. Good crops of wheat and rye were raised in Maine; but the corn has been almost entirely cut off.

Your's, with much esteem,

PARKER CLEAVELAND.

MR. SOLOMON W. CONRAD.

York, June 5, 1817.

Sir,

In consequence of a publication, signed by you, as secretary of "The Philadelphia Society for promoting Agriculture," I am induced to communicate, on some of the points, what came under my own observation. In this county, (York,) the crops of wheat are generally very luxuriant, and promise an abundant harvest. The Hessian fly has done little or no injury; at any rate, it cannot be discerned by examination.

The only effectual remedy for preventing the dreadful effects of this destructive insect, is late sowing. It is believed, that sowing after several severe frosts, or about the first of November, is the only method discovered by experienced farmers, to prevent the fly's ravages.

The grub, or cut worm, as it is generally called, has done injury to an alarming extent. Some fields of corn are entirely destroyed, and require re-planting. Some farmers have made use of precautionary means, by rolling the seed corn in ashes. It is supposed that the ashes, adhering to the grain, render it unpalatable to the cut worm. These means have actually answered the expected purpose, and have facilitated the vegetation of the plant. There is another remedy, which has also proved destructive to the cut worm, and a preservative to the tender plant of corn, viz. When the plant is just piercing the soil, take a tea-spoon full of slacked lime, (or even more will do no harm,) and scatter it on the plant. Another method,—Roll the seed corn in slacked lime, it will produce the same result. These experiments have been tried, and I firmly believe will answer the expecta-

tions, and indeed far exceed them. I had a field of corn ploughed last fall, late in the season, it having been a clover field, with a view of preventing the grub, or cut worm, from destroying the corn plant, this spring, but I find that the worm is even worse in this field, thus prepared, than it is in fields that were broke up early in the spring for corn. If this hasty communication can possibly be of any service to the important interests of agriculture, I shall be happy in having contributed my mite.

Very respectfully,

Your obedient humble servant,

JOHN GARDNER.*

MR. ROBERTS VAUX.

* It is unfortunate, that in the practice of an art in which mankind, in a state of civilization, are so much interested; there should be not only adverse *opinions*, but clashing *facts*. It must be from the balance of the latter only, that a profitable result can be established. Nor can we be so well informed, as we ought, of the circumstances and steps, under and by which, the conclusion, as to even the alleged fact, is arrived at. Much inquiry is now in progress on the subject of fall ploughing, as it affects the cut worm. *In itself*, if no such enemy to our corn crops existed, it is of essential use; not only as it meliorates the soil, but forwards the business of a farmer, by performing a preparatory operation to planting, at a time of more leisure than the opening of spring generally admits. It will be found, however, that the balance of facts is favourable to the practice of fall ploughing, well executed; and especially, if *lime* be applied, and well harrowed in; at a season when it is placed in a situation to have its causticity subdued, by the ensuing winter. Some who plough deep and well in the spring, find lime to operate so as to repel or destroy the grub, in a great degree. But the fact, of *fall ploughing* being a remedy, or preventive, (and it may not be the sole preventive, or remedy,) is all essential. It may not *alivays* succeed; nor does any other agricultural operation. The cut worms may be, as they have

been, overwhelmingly destructive and numerous; so as occasionally to baffle every human effort. But there is no justification for our neglecting any thing, which has been successful, in multitudes of instances; or practicing bad tillage, by what is called *listing*, or throwing up a few furrows of the sod, and leaving the rest of the field unploughed. This may be sometimes apparently warranted by the event, as to the grub; but, to meet one *occasional* misfortune, we should not establish a reprehensible habit of permanent hostility to the foundation of all good husbandry,—complete and frequent aration. Good farming, manuring, and late sowing, do not always guard against the fly. Yet in a very great majority of instances, as in the one mentioned by our correspondent, they are successful. The chastisements we experience from both the grub and the fly, correct bad habits; and force on us amendment in our agricultural practices, and sedulous attention to the destruction of vermin.

R. PETERS.

Brandywine, 6th Mo. 4th, 1817.

Esteemed Friend,

A farmer is now with me, who says he has planted his corn the *third time* this season, and finished yesterday only ; the grub having nearly destroyed the whole that was in seven acres.

He also relates, that his neighbour's field, of about twelve acres, *separated only by a fence*, is quite good, and except about ten hills, he has not been obliged to re-plant at all.

He likewise relates, that both fields were ploughed last season, and cultivated alike in all respects, but that his neighbour's field being overgrown with *wood grass*, it was *burned* off last fall, before ploughing ; he knows no other method of accounting for the different state of the corn in the two fields, and I mention this fact, as it may throw some light upon a matter, very interesting, not only to our agriculturists, but to all the inhabitants of these states.

There is reason to fear that the corn but just now planted, can yield little or no crop, unless the remainder of the season be uncommonly fine ; and as the corn of rich lots, that has not been injured by the worm, is scarce four inches high, there is much reason to fear, that our corn crop will be very short this year, as well as the last.

Thy friend,

WILLIAM POOLE.

ROBERTS VAUX.

Springfield, Delaware Co. June 6, 1817.

Sir,

Seeing that the Agricultural Society are desirous of ascertaining what modes of previous preparation of the soil have been found to prevent the corn grub, or cut worm, I will give the information as respects myself. Late in the month of March last, I ploughed a twelve acre field all up, and harrowed it well; I then marked it out both ways, four feet, and planted my corn the first week in May. The cut worm destroyed the whole of the corn. I ploughed about eight acres, by backing two furrows together, and was careful to plough about four inches deep, and that none of the furrows fell back, to give the worm any chance of getting up on the ridge; this I did about the middle of April. In order that I should work it both ways, and that there should be no marks made, to enable the worms to get to the hills of corn, I got my light cart, and put a man in to drive the horse, and a boy to move the poles, and that made a sufficient mark to plant my corn:—the cut worms have not destroyed one hill in a thousand. There are great quantities of them, which feed on the grass, and one would suppose, to see where they have eaten the grass, that sheep had been in. Spots are eaten entirely bare. They have suffered very much by getting into the furrows, they being so deep, that the grubs have not been able to get out. I am now ploughing up the middles, and my corn is sufficiently large to harrow, which I intend doing as soon as I finish ploughing. There is one other way, that will, in my opinion, completely destroy the worm, that is, in the spring, as soon as the worm makes its appearance,

which will be about the middle of April, burn your ground in any way you can:—where there is no furzy grass, it would be worth while to have straw or leaves: be careful not to burn it too soon in the spring, before the worm makes its appearance. As to the Hessian fly, we know nothing about them, only that they are eating the wheat in my neighbourhood.* I think about one half will be destroyed by them.

* The wheat so much injured has probably been badly farmed; or some uncommon circumstance has occurred to that so ruinously attacked by the fly; for we are authorized to say, without doubting our worthy correspondent's statement, that there is as good wheat now growing in that neighbourhood, as any in the county; and very little, if at all, injured by the fly. As to ploughing in grain, to prevent the stunt, its efficacy is not found in the parts most subject to this malady; for where it prevails most, it is a common practice to plough in the grain. W. Graham, Esq. of Chester, has a corn field uninjured by the cut worms; (which are in great plenty in his field,) owing to an accidental growth of buckwheat, which he suffers to remain till the grub has passed away. The worms are found among the buckwheat, and in tufts of sorrel, in great numbers; whilst the corn hills are entirely free from them. This seems to show, that they have no predilection for Indian corn, but prefer other plants. If this should really be the case, they will be a greater scourge than they are by being occasional destroyers of corn: for they will seduce people wishing to save trouble, into slovenly farming, to guard against the grub; whose visits may cease, but bad habits endure. Mr. Gibbons has furnished another proof of the "salutary effects of FIRE on soils;" and it will be found, the more it is attended to, that proofs without number can be afforded; not only as it regards the destruction of vermin, but as it respects the melioration of the soil. See Vol. III. Agric. Mem. pages 214, 15, &c. See Mr. Poole's account of burning the *wood grass* on a field, having prevented injuries by grubs.

R. PETERS.

The stunt is a new thing among us, but as far as I am able to judge, the cause is, that wheat that is ploughed in, is not so subject to the stunt, as that which is harrowed in, for this reason,—the wheat that is harrowed in is not covered sufficiently deep to give the root a proper hold of the ground, and therefore, in the spring, when the ground settles, it leaves the root bare, and it is not nourished, and of course stops growing. The best method I have found for a crop of wheat, is to plough it in, and let the furrows be pretty coarse, and in the spring it will moulder down about the root, and by covering it, be of great use to the wheat.

I am, &c.

JOSEPH GIBBONS.

MR. ROBERTS VAUX.

Upper Providence, Del. Co. June 1, 1817.

Esteemed Friend,

The ravages of the cut worm, in this neighbourhood, have exceeded all former experience; and should the remaining part of the season be unfavourable, no corn crops, or very partial ones, will be obtained this year.—Being myself one of the sufferers, from this ambushed, and indefatigable enemy, I have been trying to discover some means by which the corn may be protected; and, if possible, the worm destroyed. And whatever the process should be, I concluded *that* best, (if effectual in arresting the worm,) which should be performed with the least labour, and the greatest expedition, after the corn was planted. I believe I have succeeded in my wishes, and do myself the pleasure to communicate, through you, to the Agricultural Society, for the purpose of general usefulness, the plan I have adopted.

I propose to take a pair of narrow cart or chair wheels, securing on the outside of the rim, or tire, two or four projections, somewhat similar to the tooth or cog of a mill-wheel; and so formed, as to impress in the earth a hole four inches in depth, and of an elliptical form, which will be made by tapering the tooth from the four sides to the centre.

The wheels thus prepared are to be taken through the field, by a horse, immediately after planting, in directions alternately opposite, that in going and returning, they will track and make the holes on each side of two rows of corn; should the number of holes made in going and returning one way over the field, be insufficient, it may be proper to cross at right angles to the first

course, as we do in marking out for planting. Thus will the wheel tracks and holes be so numerous, as to render it very difficult, if not impossible, for the worm to arrive at the corn. It may appear strange, that these vermin can crawl up the sides of a clean tin cup, and yet are unable to raise themselves up the inclined sides of a very shallow trench, if the ground be light and crumbling. These facts I have ascertained by experiments; and therefore conceive, that the worm, in searching for the corn, will get into the track, which will conduct it to the hole, into which it will be precipitated, and there perish. In addition to this, I can state, that I have had the plan in operation, and find it answers completely.

The pressing and polite invitation you gave me, to furnish the Society with any circumstances in my practice, likely to promote the interests of agriculture, aided by the desire to be useful, is the only apology I can offer, in making this communication, to which I subscribe myself, respectfully and with sincerity,

Your friend,

PARKE SHEE.

MR. ROBERTS VAUX.

P. S. My plan of fitting up the wheels, for the purpose I have stated, is simple, and may be accomplished in a few hours. If you desire to know it, I will make it the subject of a future communication. P. S.

London Grove, 6th Mo. 14, 1817.

Dear Friend,

Observing thy invitation to farmers, in the Freeman's Journal, I sit down to communicate some remarks which have forcibly pressed themselves on my attention. Being neither philosopher, chemist, nor botanist, and more disposed to profit by my neighbours' experiments than to hazard any myself, I shall confine myself to such facts as have met my eye in the humble avocation of a ploughman.

The severity of the weather in 1816, which prolonged the cold till after midsummer, made dreadful havoc among the eggs and nestlings of all wild birds, and destroyed thousands of the old. These birds, we know, chiefly subsist and feed their young upon flies and creeping insects, of every description: I might say entirely, since in the breeding season there are no ripe seeds to assist them in that office. It follows, that flies of all kinds, and their larvæ, which include, I believe, worms and caterpillars of every description, except the varieties of the so called earth worm, must have abounded and multiplied in an uncommon degree. The cut worm fly, (which we believe to be shaped like the musquitoe, but three or four times its size, of a dull yellow colour, with long legs extending remarkably behind as it flies,) and the Hessian fly being comparatively undisturbed, had full leisure to deposit their eggs; and few can have failed of remarking, that the migratory tribes of small birds are, this year, perhaps, not by one twentieth so numerous as usual. Blackbirds especially, which used to visit our fields in clouds, at the very season when the cut worm

makes its ravages, are rarely to be seen, and not more than a single bird, or a very few indeed together. Even the common crow (a ravenous devourer of vermin) appears here to be almost extinct.

Having never made the changes these insects undergo a subject of study, I must be silent on that head ; but if the society should be led to believe, that the absence of their natural destroyers is a main cause of their present increase and alarming depredations, a remedy presents itself, if the public will be prudent enough to adopt it.

Let it be recommended, under the sanction of their respectable authority, to printers through the state, to urge (as of serious importance) that sportsmen, young and old, should abstain from shooting or otherwise destroying blackbirds, robins, jays, catbirds, swallows, sparrows, &c. &c. If I be right in my conjecture, the most valuable consequences to agriculture, will follow such a jubilee, and the measure has this to recommend it, that its motive may be made clear to every man's capacity ; and if it should produce no solid good, it is at least an act of mercy.

No wheat that I have yet known will *uniformly* resist the attacks of the fly ; nor do I believe, from the nature of the attack, that such a wheat will ever appear. Jones's, and the orange straw, (bearded,) seem to suffer least. The surest preservatives are strong manuring and late sowing ; not so late, however, as to hazard the mildew. No previous preparation of maize will prevent the cut worm ; but steeping in putrid chamber-lye, or liquid tar, and rolling in plaster or sulphur, one part of the latter to four, will quicken and invigorate the first growth, and nearly save the grain from destruction by birds. It might

be worth trying, whether cane brimstone, (a very cheap article,) finely powdered and mixed with plaster above ground, would not check the depredations of the worm. Holes made near the plants have destroyed inconceivable multitudes, as have perpendicular-sided, narrow trenches, between the corn field and grass or clover land. Amos Harvey, a respectable maltster and farmer on Brandywine, speaks of many bushels being taken in this manner by a person in his neighbourhood.

I have pulled up many plants of wheat, diseased with the stunt; in some I have found a tough, slender, reddish worm, (I believe the true wire worm,) in the core of the root; in others, the fibres have been decayed, and many covered with a light grey or whitish mould, appearing like lime-clean seasonable tilth. Sound, plump seed, and timely manuring, with ripe dung, I believe to be the only preventives.

I remain, thy sincere friend,

HENRY COX.

ROBERTS VAUX.

It has been long suspected, that insects were the causes of the stunt in wheat. The wire worm in England, produces the same effect. The remedy is there to *steep* the seed, or roll it in quick lime. In our appendix to volume 2, pages 95, 96, Mr. Sommerville recommends mixing lime with dung, (to destroy insects,) after the fermentation has sufficiently progressed. It will be seen in a paper in the present volume, that success has attended a change of seed, (so far as respects the stunt,) from the

wheats commonly sown, to the purple or blue straw wheat. Mr. Cox's account of the worm found in the root of stunted wheat, is a proof that worms or insects are the enemies to be subdued. Such vermin abound the most in dunged grounds; and in the accounts we have of the sedged or stunted wheat, the malady is the most severe, where cow pens for winter feeding have been placed.

The supposed "cut worm fly," is, most probably, an *ichneumon*, bred in the grub. Entomological writers aver, that the ichneumon fly, deposits its eggs in caterpillars, (and the grub is a species of caterpillar,) and thus brings its own progeny into existence, by the destruction of the larvæ of other insects. The varieties in colour and shape of the ichneumons are numerous; there being more than four hundred different species.

R. PETERS.

Buckland, Prince William county, (Va.)

June 17th, 1817.

Sir,

But little elucidation of the subjects of inquiry contained in your public letter of the 5th mo. 30th, 1817, can be expected from a part of the country where agricultural improvements are so little advanced as in this. We have indeed profited by the accidental intercourse some of us have had with Pennsylvania, and derived from thence the possession of the means, as far as experience has unfolded facts, of escaping the ravages of the *Hessian fly*. The kind of wheat cultivated in Chester county, in 1810 and previously, called Jones's white wheat, was brought by James Lawler to Fauquier county, in Virginia, in that year, where, and in the adjacent counties, it has been since cultivated, without experiencing injury from the fly. This fact is established by sundry certificates, published in the National Intelligencer on the 5th inst.

For a history of this variety of wheat, beyond Mr. Lawler's information, we shall actually look to your quarter, and anticipate, from the inquiry you have invited, the gratification of an account of its origin.

One of your inquiries conveys the supposition that the purple straw, and golden beard wheats, resist the attacks of the fly. The experience of this part of the country is against the supposition. If it is the case in Pennsylvania, where perhaps these kinds of wheat were lately introduced, the circumstance discloses an important fact in agriculture.

The very seasonable spring we have had, seemed, at one time, to have providentially interposed between us and this destroying mischief; but, since the wheat has come into head, we find it stand very thin, even on good soils, few stalks not wounded, and many falling daily, in their progress to maturity, giving the wheat a tangled appearance; while the fly continues to depredate on the tender stalks, lately put forth, and will probably destroy them all. Throughout this country, the degree of injury is various, except in the Jones wheat, which has sustained none; and the difference of degrees is sometimes exhibited in the same field, without any known circumstance to account for it. The general estimate of injury in this part of the country, from the ravages of the fly, cannot, I think, be made less than three-fourths of the crops. In former years, the proportion of wheat made into flour, for exportation, was at least as ten to one of the consumption; but, from the circumstance of the crops of Indian corn having been very short, many will be obliged to feed entirely on small grain, for four or five months to come; therefore, in all probability, not more than one-half of that made will be for exportation.

In this immediate vicinity, the disease called the *stunt* is unknown.

On the subject of the *cut worm*, it cannot be said that any remedy, tested by general experience, has been discovered. In this neighbourhood, its effects have been partially felt, in some instances, without any known cause for the difference in others. Causes have been assigned. The one most generally accredited, is found in the mode of cultivation. When the ground has been partially broken up, the injury from the worm may be said to be

less; and I think, from observation, it may be added, that the injury is in proportion to the quantity of soil disturbed. The mode practised some where, as published in the news-papers, of making a hole in each hill, I am told, was tried by one of my neighbours, but did not succeed, as in the only instance where he found worms in the hole, they had cut off the corn before they fell in it!*

In Virginia, we cultivate so much land in corn, in order to make the necessary quantity for man, horse, and ox, that it would seem to be a task of hopeless termination, to erect a pit-fall in every hill, especially in light and crumbling lands.

I am, sir, your obedient servant,

JOHN LOVE.

MR. ROBERTS VAUX.

* The holes ought to be made in the track of the insect. J. M.

*Kinnersley, Queen Ann's County, Md.**June 10, 1817.*

Sir,

Considering it desirable that the erroneous impression taken up by many persons, should be removed, as regards the blue or purple straw wheat being exempt from the ravages of the Hessian fly, I can assure you that that kind of wheat, throughout this district of country, has suffered considerably more than any other kind. At different periods, I have been induced to purchase the blue straw, the red chaff bearded, the yellow bearded, and the white Washington wheat, which last named wheat is the favourite of all the farmers living on the best lands of Wye and Chester rivers, all three kinds recommended by different persons, as suffering least from the Hessian fly. In the course of twenty-five years' experience, I have no reason, on that score, to give either the preference: they are all equally sufferers, by the ravages of that destructive insect.

Farmers have tried different modes to get rid of this troublesome and voracious fly, but I cannot say that I have ever heard of any person's having been able to succeed in getting clear of their visits. A gentleman of my acquaintance, Matthew Tilghman, Esq. formerly of Kent county, a few days since informed me, that he once immersed his wheat, for a few seconds, while in a sieve, in pots of boiling water, then suffered it to drain for a minute or so, and afterwards threw it on the barn floor, and sprinkled quick lime over it, and spread it thin, to dry: this course he followed every evening, scalding as much wheat every evening, as he intended to sow the following

day. This plan he was induced to adopt, from a publication he once read on the subject; the person publishing being under the impression, that the egg of the Hessian fly was deposited by the insect, during the time the wheat was in head, about a month before harvest. He reaped a good crop, and means again to pursue this plan the ensuing fall. I have made up my mind to follow his example, being confident, if it does not succeed in destroying the fly, that it will, at all events, give the young plants a vigorous and quick growth, and most likely be the means of increasing the crop. Lyttleton Gale, Esq. deceased, who formerly lived near Havre de Grace, on the Susquehannah river, informed me that his crop of wheat was much increased, in consequence of soaking the grain, and rolling it in plaster, until it had taken up all that would adhere to it. The part of his crop which I saw, was in full head, and about six inches higher than other wheat, sowed along side of it, on the same day, which had no preparation whatever, but was sowed in the common way. Whether the grain that was soaked and plastered, was soaked in hot or cold water, I did not ascertain. It was not done with a view to avoid the fly.

Some years since, being under the impression that the Hessian fly deposited the egg in the young wheat, after it had vegetated in the fall of the year, to avoid the first flight, persons in my neighbourhood were in the habit of sowing as late as possible: they began to sow from the 1st to the 10th of October, and continued to sow until the latter part of November; the crops, of course, were light, not exceeding what might be called half a crop, could the wheat have been sowed about the 1st of September. About a fortnight before I sowed my crop, I was in the

practice of sowing down my turnings in rye, for the purpose of attracting the fly, and causing them to deposit the egg therein, and always thought my crop was benefited thereby. The turnings sowed down with the rye were invariably destroyed, and the wheat only partially injured. This plan is totally at variance with that of soaking the wheat in hot water, or rather scalding and liming it; which of them is correct, will remain for future experiments to decide. The destruction this season is so general, throughout this and the adjoining counties, that it is the opinion of the best informed farmers, that more wheat will not be made than will suffice for seed, and bread for family use. With the exception of my son's farm, at Swan point, in Kent county, (the land whereof is of very superior quality to the farms in general,) I know of no one that will produce a fall crop; the ground there is handsomely covered with wheat. A considerable part of his ground, where his fallow wheat is, was manured with the sea oak, or weed, from the bay. Benjamin Chew, Esq. of your city, can describe the Swan point farm to you, if necessary to your inquiries. As to what you term the stunt, I presume it is, what in this part of the country is termed sedging, or putting on the appearance of young sedge. This, I am of the opinion, is caused by an insect that girds or eats round the root, and causes the plant to die. With a small magnifying glass, I have discovered an insect among the roots of the sedged wheat: a microscope would enable a person to give a better description of this insect. The best lands, particularly bottoms, and *hills that have been aided by manure, suffer most*; indeed I have frequently been obliged to plough up land, sowed in wheat, (the

plants having been totally destroyed,) and set it in spring grain. The wheat has sledged with me in corn field ground, as well as in clover lays and old field fallow,—in one as bad as the other. No remedy for this has ever come to my knowledge.

Having purchased some land adjoining my farm last year, it became necessary to alter the laying off my farm and I was compelled to sacrifice a crop of young clover, which I had sowed this spring twelve months, to bring my fields into the rotation contemplated; this clover was sowed on a wheat fallow, and of course my corn was planted on the stubble of this field; it is very free from the worm. The crops of my neighbours, planted in the old pasture fields, are very much injured by the cut worm; and I am informed, that the best chance to ensure a crop of corn, is to plant in the stubble fields: the standing of my crop seems to prove that fact. I always tar my corn, and roll it in plaster, and never failed till last year, in making a crop; my failure then was occasioned by the backwardness of the spring season, and the early setting in of the frost. Immense quantities of corn were destroyed last year by the early frost. Tarring and plastering will certainly prevent the birds from pulling it up, and thus ensure the first planting to stand. I am anxious to have a description of the wheat, called Jones's white wheat, said to withstand the attack of the fly; and would esteem it a favour, if you could ascertain the truth of the statement lately published, stating it to have been brought into Virginia by a man of the name of Lawler, from Chester county, Pennsylvania. I want faith, after the many kinds I have tried, of any particular kind of wheat being exempt. If you can give me any

information on this subject, I shall esteem it a favour. M. Tilghman, Esq. informed me that a man had scalded some wheat, limed it, sowed it in a box, and placed that box beside another box, in the south window of a room, where no fly could get at it; they both came up, and the limed wheat was clear of the fly, while the other was full. I think his information was obtained from a gentleman of the name of Brown, from New York: the experiment is easily tested. I write in haste, and with the hope of being useful. I do not mean to assert that there are no other good crops in Kent county; I have heard of one or two others, but have not seen them.

Your obedient servant,

RICHARD J. JONES.

MR. ROBERTS VAUX.

Those who pursue experiments, founded on the mistaken origin of the fly, as being in the head of the wheat, or in anywise affecting the grain, should spare themselves that trouble. It is well ascertained that the fly deposits its progeny in the young plant, near the root; and its injuries are ruinous to the straw. The grain is never affected in any other way, than as it is shrivelled and imperfect, by the circulation of the juices which should nourish it, being impeded by the pressure of the nits, or the tegument enclosing them, on the vessels of the stems. When solid straw, or vigorous pipy stemmed plants, resist this pressure, and the grain is perfect; the flour is as excellent as if no fly had infested the plant. This is mentioned, because, in an European publication, I have seen unmerited odium cast on American flour; as having been rendered unwholesome by the *Hessian Fly*. The southern *moth* fly injures both the grain and flour. The grain of wheat is its *nidus*.

R. PETERS.

Lucky Hit, July 23, 1817.

Dear Sir,

I received, last fall, a publication of your society, requesting information on the peculiar effects of last summer's climate, and should long ago have replied to it, had I been in possession of curious, or even plausible speculations. With respect to useful or important matters of fact, I cannot say further, than that all vegetation that could be improved in its growth, after the fall rains, was very productive; potatoes, cabbage, and roots of different kinds, yielded plentifully, and supplied the place of corn in a great measure. Your society well recommend the cultivation of potatoes, they are an excellent auxiliary to corn, and rarely fail, with decent culture, in tolerable land. You mention some queries on the subject of the grub worm, published by your society. I have seen, in the *Intelligencer*, six, on wheat, fly, worm, &c. published in May last, by the secretary. I will follow them in their order, with the little information I may have. 1st. The stunt is scarcely known on this side of the mountain; but having learned that it was very prevalent in Loudon county, I have no doubt you may derive much information from thence. With the fly, and its effects, I am very intimate, having lost eighty acres out of one hundred and ten: or rather, thirty acres completely, fifty acres may produce five bushels per acre, and the balance, thirty acres, probably twenty bushels per acre; in all, about two-fifths of a crop. The last mentioned thirty acres was of the purple straw, sowed on a corn field, the stalks previously cut and stacked, the ground harrowed down with a heavy harrow, and the

wheat harrowed in the same way, between the 1st and 3d of October. The next best field was a fallow, sowed from the 4th to the 10th; the last field, from the 10th to the 17th: this last was good cultivation, with ploughing and harrowing, but it was too late. We are pretty certain, in fertile land, of a saving crop, if sowed from the 25th of September to the 10th of October; even our rye does not escape if sowed out of season. The fly has been more destructive this season than I have ever known it. Early in May, our prospects were more flattering than had ever been known, but by the middle of the month, after some warm days, from the richest verdure appeared a dry naked field. 2d. The only remedy that is known against the fly here, is sowing in good season, and stimulating the soil. 3d. The only kind of wheat that resists the fly, is called the Snider, above the mountain,—the Lawler, below, said to come from your state. It has been raised for ten years in this county, and I have undoubted proof that it has never been injured by the fly, but it is subject to the rust, and a worm; has a short head, and I consider it an unproductive wheat. I sowed two bushels of it in the midst of a purple straw field, at the same time with the purple straw, and found it to be a week later than the purple straw which was around it, and half eat up by the fly, while the Snider was unhurt. The golden and purple straw has always had much the advantage in its appearance, and has been considered by far the most productive wheat. Little has been said about the Snider, or Lawler, until the present year, it is now making a great noise: though an indifferent head, it has a beautiful grain: it may be sowed early, to advantage. Although the purple is very subject to the smut in this

part of the country, I shall continue to sow it, on account of its great productiveness. I have never had the smut in it yet. Four years ago I let Mr. Richard P. Barton have thirty bushels, to get in seed, which produced a fine wholesome crop, but the proceeds of the next sowing, from the same wheat, were very much smutted. Query, How can this be accounted for? 4th. With respect to the stunt, I have said already that we scarcely know it. 5th. With respect to the grub worm, which has scourged us severely, I can give you but one experimental remedy,—picking them out of the hill of corn, and killing them; this is laborious, but certain. We find that no ground is always exempt from the worm, except it be new ground. Wheat stubble is frequently destroyed, when clover land escapes. Fall ploughing fails when spring succeeds. I have lost twenty acres this season, not being able to keep the worms out of more than forty acres. 6th. The philosophy of the cut worm is but little known here. We want spirited inquirers on those subjects. Should I be able to get any useful hints about them, I shall communicate them.

Yours with regard and respect,

R. K. MEADE.

HON. RICHARD PETERS.

Many years ago I had heard much of the *Jones's wheat*, (now called *Lawler*;) as to its capacity to resist the fly. I procured the best seed; and faithfully cultivated it, during several years. I never have been injured by the fly, in any degree equal to many others. I did not perceive the advantages, on this account, this wheat is said now to possess. I abandoned it entirely, as unproductive. It grew in single stems; and I lost more by scanty crops of this wheat, than I had ever suffered by the ravages of the fly.

R. PETERS.

Jackson, Tioga, Penn. July 10, 1817.

Sir,

Having perused a piece in a public print, headed "Agricultural," in which your society requested the citizens of the United States to forward information respecting the destructive insect called the Hessian fly, and being desirous of diffusing all the useful knowledge which lies in my power, I take the liberty to forward the following communication to your society, which I have from good authority.

It is most certain that the fly lays its egg in the fall or autumn of the year, which continues in the plant during the winter ; to prevent which, take one or two quarts of oats, and put to one bushel of seed wheat, mix it thoroughly, and sow it as usual : the oats will spring up before the wheat, fit for the fly to lay its egg in, which being done, the wheat comes on afterwards, untouched by the fly, and the winter kills out the oats, and of course the egg must perish. If this information is of any utility, I shall be amply rewarded for my little trouble.

I am, respectfully, yours, &c.

W. D. BACON.

MR. ROBERTS VAUX.

Kennett Township, Chester Co. Pa. July 8, 1817.

Sir,

In looking over the newspapers, I saw published therein a request of the Agricultural Society to their fellow-citizens, to favour them with communications respecting the injury the wheat is likely to sustain by the effects of the Hessian fly, the stunt, &c. also the ravages of the cut worm, on the Indian corn.

1st. The wheat has not sustained much injury by the fly, though it is very numerous in the wheat this spring, and causes a great many stalks to fall. The heads are tolerably filled before they begin to fall, which does not happen until about two or three weeks before harvest. The fall progeny of the fly is vastly the most injurious, if the wheat is put in early.

2d. We conceive, that the best preventive to the operation of the fly, is to make the ground good, and to sow the wheat between the eighth and fifteenth of October. As to the stunt, it has done very little damage to the wheat this season, in the vicinity of Kennett, although we have discovered no way of preventing its effects. The stunt has operated worst on the highest cultivated land, in the vicinity of Kennett.

3d. We sow different species of wheat, but most generally the red bearded; we think it resists the effects of the fly, and stands the winter better than other species.

There are good crops of wheat, barley and oats in this neighbourhood, and the crops of corn are coming on fast. It is a fine growing season, for every kind of grain and grass; indeed we have no cause to complain of any thing.

5th. In respect to preparing the soil for corn, we generally agree that ploughing in the fall is best ; though it is not a positive preventive of the worm, it puts the ground in better order. I recommend marking out for the corn the first week in May, then digging holes about ten inches square in some of the furrows, say eight or ten in a furrow, and if the worms are very numerous, in every eighth or tenth furrow. I have known one hundred worms caught, in many holes, for a number of nights in succession. As the worms don't begin to travel until about the 10th of May, I would incline to plant about the 6th, and immediately make a hole in each hill, with an instrument made similar to a surveyor's staff, with an iron socket on it, about six inches long, and a sharp point at the lower end. By making a hole about three inches deep, at the top of the hill, as near the corn as may be, I have caught from five to fifteen in each hole. They cannot get out. After the corn came up, I sent a boy over the field every morning ; if he found a stalk cut, he pulled out the worm and killed him. By the above means, I saved the last planting of my field of corn, the first planting having been destroyed. Although they began to go out of a grass field into my corn field, I carefully stopped them by ploughing a deep furrow, and turning it towards the grass field, digging a number of square holes in it : the furrow ought to be kept square on the side next to the corn. My neighbour, Jesse Pyle, had a lot of clover of about five acres, which the worms totally destroyed, and were moving from thence to his wheat field. He ploughed a furrow along each side of the field, and dug holes, to the amount of about fifty, in each furrow, of about ten inches

square: in one night, many of these holes were filled from two to three inches deep with worms. It is allowed by many who saw them at different times, that there were several bushels caught in one week, in these holes. The worms were very large. There were many clover fields destroyed in the vicinity of Kennett. There are many different kinds of cut worms, and they undergo different changes. The little blackish cut worm is transformed into a kind of dirty yellowish long legged fly, which deposits its nits in the grass, or elsewhere. The flies continue about three weeks and then disappear.

Yours, &c.

JAMES M'FADGEN.

MR. ROBERTS VAUX.

Pittsfield, Berkshire Co. Mass. August 5, 1817.

Sir,

This is agreeable to a notice I saw in the Pittsfield Sun, taken from a Philadelphia paper.

There are two species of the cut or corn worm of Pittsfield; the large worm is of the size of a large goose quill, in length an inch and one-fourth; when it is about to leave the nympha state, it becomes dull, and sinks four inches into the earth, to put on the aurelia state, which is a bright chesnut coloured shell; in forty days it comes out a clouded, mouse coloured, muffle headed miller, over three-fourths of an inch in length. The small worm, perhaps equally mischievous, is an inch in length, and in size proportioned; it takes a similar course, and comes out a miller, not three-fourths of an inch in length, in colour and marks resembling a partridge's tail feather.*

WILLIAM BRATTLE, JR.

HON. RICHARD PETERS.

* At the moment when I was about communicating the result of an experiment with the corn grub, on my own farm, I received the foregoing letter. Many grubs had been placed in a box, with sods and other food for them, by my son. His endeavours were baffled by the playful curiosity of a little grandson, who disturbed, with a stick, the greatest number of the subjects of the trial. Yet *two* passed through the stages described by Mr. Brattle; and came out large clouded *moths*; resembling that which Mr. B. calls a *miller*. Another was found by my son, in the corn field I have mentioned. It was sent to Mr. Say. I relate these facts, as being contemporaneous proofs, in distant parts of our country. Many *ichneumon flies* have been seen, bred in, and proceeding from, the carcasses of dead grubs. But these are different from the parent of that reptile.

R. PETERS.

Philadelphia, September 28, 1817.

Sir,

It is a circumstance not a little singular, that the Hessian fly is unknown to the Europeans; such, however, from all I can learn, appears to be the fact; but the name is at the same time perfectly familiar to them, particularly to their entomologists, but as it has no meaning of itself, and no analogies upon which it depends, it conveys no information to them: here then is one of the uses of a scientific arrangement and an universal nomenclature. The classical name refers directly to a natural assemblage whose habit is the same, or nearly so, hence every entomologist who learns the name of an insect, becomes at the same time acquainted with the general form of the body, manners, mode of life, &c. The European analogue of this famous insect, (*tipula tritici*, Kirby,) depredates upon the *blossom* of the wheat, and its attacks are always confined to the contents of the calyx;* our species I believe is not known to infest that part of the plant. The plate you received was drawn and engraved by Mr. C. A. Le Sueur, a justly celebrated zoologist and draftsman, it is *printed in black*; this I mention particularly, as two or three of the impressions were coloured capriciously, and were taken by some of the members of our academy; if, perchance, the one in your possession is coloured, I will furnish you with a proper impression.

* This seems to be the spotted *moth fly* of the southern states; which lays its egg on the blossom of the wheat. It is hatched in the grain; and, when perfect, eats its way through the envelope of the wheat, like the pea bug. It differs entirely from the Hessian fly; both in its mode of propagation, and its habits. R. P.

The locust is so called, probably from its appearing in great numbers at times, like the Asiatic insects commonly known by that name; but in this respect only does it distantly resemble the truly formidable *Gryllus migratorius et tartaricus*, which, I need not inform you, are considered as more destructive than any other known species of animals. The name *Locust* is therefore improperly applied to our *Cicada*, and ought to be rejected.

This insect is well known to the systems, it was described by Linné under the name of *Cicada septendecim*, and by Fabricius under that of *Tettigonia septendecim*. Latreille and Lamarck, in their systems, retain the former generic name. Besides very numerous accounts in our public prints, of the *Cicada* or locust; an account of it is inserted in the Stockholm Transactions, as early as the year 1756, and I believe in the Trans. Royal Soc. Lond. of the same year, by Collinson, with a figure. Kalm, in his travels, says they appear about the middle of May. Stoll, in the year 1788, gives a figure and short description, in his large work "*der Cicaden*." The descriptive words of Fabricius, in his *Systema Rhyngotorum*, are "*T. nigra elytris albis: costa flava*." This description is, it is true, too laconic and unessential to be good for any thing, but his allusion is well known by the specific name and synonyms. That the eggs are hatched the same season in which they are deposited, is certain; the young enter the earth immediately, and there remain for seventeen years, before they are ready to appear in the perfect state, and it is highly probable, during all that time, are in an active state.

With respect to the corn grubs I know but little. I had been accustomed to see them in the fields for seve-

ral years past, but was entirely unacquainted with the perfect insect: that they were the larvæ of some of the nocturnal *lepidoptera*, was evident from their characters. It was not until the present season, that I became partially acquainted with the perfect insect, as the product of these larvæ. Early in the summer, I received from a highly respectable source, which, except in matters of natural history, (in which it is often necessary to doubt the evidence of our senses,) I should have relied on without hesitation, a *Tipula* or Crane fly (*Limonia* Latr.) as the parent of these grubs, with every assurance that there could not possibly be a mistake, as the worms had been selected, fed, and carefully observed, during their progress to the perfect state. However absurd this appeared, it induced me to pay some little attention to the thing, the result of which was a perfect conviction that the parents were two, three, or more species of *moths*, as was at first supposed. Mr. Samuel R. Wetherill, of Burlington, presented me since with two different species of the *genus Noctua*. *Fab.* which he obtained from these grubs; and finally, I have the pleasure to return my thanks to Mr. Thomas R. Peters, for a third species, which was sent in the pupa state, but which has since appeared on the wing; still, as there may be one or two more, of which we yet know nothing, and the little imperfectly known, or not positively ascertained, even of the above species, induces me, consistently with a prudent caution, to remain silent about them, until the return of another season shall enable us to make further, and more accurate observations. Very respectfully,

Your obedient servant,

THOMAS SAY.

HON. RICHARD PETERS.

*On raising Indian Corn, by W. Noland, Esq. in a letter
to Thomas Leiper, Esq.*

Aldie, March 30, 1817.

Dear Sir,

It was only a few days ago that I was able to procure an answer to the inquiry contained in your letter ; and this must be my apology for so late an acknowledgment of your favour. The land which produced the crop of corn, to which you allude, was prepared in the usual Loudon county mode ; which is, to plough deep, turn over the sod well, and harrow the whole. The field was laid off in furrows, four and one-half feet apart, and the corn drilled at from eighteen inches to two feet apart. The corn planted at that distance produced fourteen barrels to the acre ; but where the furrows were again divided, so as to make the distance between the hills from two feet three inches to eighteen inches, or two feet, which was the case with three or four acres, the product was eighteen barrels* per acre. Had the season been a good one, I am confident twenty barrels per acre would have been made ; and this, too, on a field very uneven, and improved entirely by plaster and clover. As many as sixteen barrels per acre have been made in this county, from planting three feet each way ; but it is believed that more corn can be made from the drill mode than any other. Mr. Delaplain, of Maryland, who made from twenty-three to twenty-five barrels of corn per acre, planted in drills ; as did also Mr. Machir, on the south branch

* A barrel contains five bushels.

of the Potomac, who made more than thirty barrels per acre. In planting corn in drills, the tedious mode of covering with hoes may be dispensed with, as the harrow answers a much better purpose, and covers the corn lighter and more even. Harrowing over the corn when it is about six inches high, is an universal practice with our best corn growers. You ask how you can, by plaster and clover, make your lands produce thirty-five bushels of wheat per acre? I answer, *plough deep, sow not less than one bushel of clover seed on ten acres of the land in which you have wheat, rye, or oats; sow a bushel of plaster to the acre on your wheat, in the fall, and a half bushel of plaster, mixed with a half bushel of ashes, on your clover and wheat, and a bushel of plaster on your clover fields, in the spring.* Make a fallow of your clover fields every third year, and I think you may calculate on thirty-five bushels per acre. With respect to the old field that you contemplate sowing in oats and clover, I would not advise you to plough in the clover this fall, nor would I the next fall, were the clover promising.

I am, with great respect, yours, &c.

W. NOLAND.

THOMAS LEIPER, ESQ.

*Wire Fence ; Oats ; Jersey Manure ; Corn ; Grubs ;
Fall ploughing, &c. &c.*

Belmont, August 3, 1817.

Sir,

This past spring, I enclosed a part of my lawn, for the purpose of tillage, preparatory to laying it down in grass. Forty pannels of the fence, of nine feet each in length, and four and a half in height, are constructed with *dead posts*, hewn and painted, and *wires* of sufficient sizes running through them. The number of wires *five* ; the lower two at eight inches, and the others ten inches apart, which I find sufficient to turn all invaders—small hogs excepted ; and it seems equal to this, if the hogs were well yoked, as they ought to be. Each pannel of wire is bound by a vertical one in the middle, with a loop through which every wire passes ; so that the whole oppose a resistance conjointly. This is better than any other mode I have seen ; and does not permit horses or horned beasts, with their heads and necks, to separate the wires, and trespass as far as either can reach. It is a little neater than a common fence would require, is amply strong to resist any horse, or other even mischievous assailant, and costs little more than a common five railed cedar fence, of good materials. The plan of wire fences, with trees for posts, I dislike ; as the trees shade and exhaust the borders of fields to a greater amount in value, than all the expense of dead posts and their renewals.

I sowed oats, (thicker than usual for a crop,) to precede winter grain, *on* or *with* which I shall sow grass seeds. Knowing that oats ripening the grain is a very scourging crop, I have cut it, as soon as the panicles were completely formed, for *hay*, bound in sheaves to be chaffed in my straw cutter; the excellent qualities of such hay being well known to me. I have mentioned these circumstances, with the view to communicate an occurrence which agreeably surprised me. Four years ago, I procured forty tons of Jersey manure, and spread it as a top-dressing on many parts of the Belmont farm, on sand, clay, loam, and in every variety of exposure, as well as on moist and dry grounds. But in no instance any profitable effect appeared. A broad strip of the lawn, light and sandy, had been top-dressed, and showed no signs of melioration heretofore. This strip is part of my little oat field; and it has thrown up a most luxuriant growth; far exceeding any other part, (though the whole was good; having been well *limed* throughout,) and afforded a proof that this manure agrees and co-operates with lime. I never saw, in the richest soil, stronger, better headed, or more promising plants. It would have been incompatible with my objects, or I should have suffered it to ripen, for experiment of its product. Mr. *Mark Reeve*, who is very intelligent on this subject, (and to whom I sent a sample of the manure,) informed me, that I had been imposed on by the person from whom I procured it; the article used by me being only the cover of the true kind. Its effect, luxuriant as it is, must have been far more so, if the perfect manure had been used.

To show what may be done by patient perseverance and industry, I mention; that my tenant, (on shares,) has eighteen acres of Indian corn, equal to the best crops in the most favourable seasons. All my fields are well *limed* and productive; and this field about equal to any other. I endeavoured to prevail on the tenant to *fall plough* for his corn; but he is an old fashioned farmer, bigoted in rooted opinions. He thought that early spring and deep ploughing, with the lime, would do every thing. The field was admirably ploughed, clean, and well managed in every respect. But his corn was attacked by an host of *cut worms*, which I had predicted. My tenant was determined to *back his opinion*, and unwittingly staked his life to support it: for in the end he had nearly destroyed himself, as well as the grubs. He is an aged, and rather feeble man; yet he accomplished the extinction of the cut worms, with very little assistance from his family, by actually mashing them with his fingers and feet; though he might have gathered and destroyed them by means less disgusting. I confess I had not the most distant belief that it was possible for him to succeed. But he is rewarded for his toil; and is now recovering from an attack of fever, and consequent debility, brought on by fatigue, against which I had often warned him. I do not think his re-seeding (to which re-planting from a seed bed in a corner of your field is far preferable) was anywise equal to that required in common cases. Part of the field is flat and strong ground; and a part light sandy loam. In this latter the grubs were comparatively few; and the corn, at first, the best. But now the crop on the low ground, in which the grub most abounded, is equal, if not better. So that from this example we may

conclude, that an *able man*, with a few boys, need not despair of success in ridding his field of grubs by the means mentioned ; if he will not believe in, and take any other. My tenant found the most proper times to secure his prey, were before and at day break, and in the evening ; as the grubs always retire from the sun. Yet he did not intermit his pursuit through most of the day.*

Some of my neighbours have derived benefit by making deep holes, with a pointed stick, near the corn plants ; in which one neighbour trapped an inconceivable number of grubs.

In an agricultural society in my neighbourhood, it is a practice for the members, respectively, to state such *facts* as have come to their knowledge, on their own and other farms ; they being intelligent practical farmers. At a late meeting, which I attended, facts, *pro and con*, on the subject of *fall ploughing*, to prevent injuries from grubs, and for other valuable purposes, were candidly stated. In some instances, fall ploughing had not been successful to the extent usually experienced ; but in none had it entirely failed. The balance of facts was completely favourable ; not only as it regarded the grub, but in other beneficial effects on crops. Some had fall ploughed part of a field, in preparation for a spring crop of oats or barley ; and left another part to be ploughed in the spring. The oat crop far exceeds, on the fall ploughed part, that ploughed in the spring. *Lime* is generally used by all the members. The facts as they are verbally stated, are recorded by the secretary, and a great num-

* We had fifty bushels of shelled corn to the acre ; a good crop in any year, on a clover sod, without dung.

ber, highly useful, thus collected. These would be lost, if written communications were expected; for none such would be made. Several instances of *listing*, or throwing furrows together, and leaving balks for the grubs to feed on, were stated. This slovenly practice had succeeded in some instances, but in others it had entirely failed. So that *vicious husbandry* meets with the fate of moral vices,—it does not always succeed: and in that case adds selfreproach to disappointment; the more bitter when nothing is gained by the reprehensible endeavour.

One member had been in the practice, (not approved,) of planting Indian corn in a field wherein corn had been the preceding year. He stated that the grub never annoyed him; and supposed his escape to be owing to the parent of the grub preferring soddy ground to that loose by the tillage and cleanliness of the corn crop of the preceding year.

One member had a *smutty* crop of wheat on his low ground; but the grain was fair and free from smut on the hilly part of the same field: the seed of the whole being alike. Query, Why?

I had steeped in a solution of *copperas*, as directed by the Flemish receipt, published in *Sir J. Sinclair's Tour through Flanders*, a bushel of my seed wheat, last fall. Another bushel, I wetted and rolled in *plaster*. The straw of both was very fair, and perceptibly brighter than that of the rest of the crop, which was all good. But that rolled in plaster was far better headed, and in every way superior. A small part of my farm I reserve, for culture under my own direction.

I should have mentioned, that the crops of corn are not *generally* good; having been much injured by the grub.

But if we have a favourable autumn many fields will be productive; as the second and third planting look thriving, and some very late planted (late in June) are very promising. My tenant's field is rivalled, and it is said, exceeded, by another in the neighbourhood; but *that* was *fall ploughed and had no grubs*; though they were ruinously plenty on adjacent farms. Some fields were only in part fall ploughed. In such cases the grub migrated from the part unploughed in the fall, and more or less injured the corn on the other part. In one case, the skirts or borders of a fall ploughed field were injured by grubs migrating from unploughed fields adjoining; tho' in other instances this had not occurred. In such cases (of ploughed fields surrounded by those in sod,) it was proposed, that deep furrows, (the perpendicular sides next the corn,) should be made round the corn field, to obstruct the passage of the cut worms from other fields. Several instances were given, wherein the grubs could not scale such a wall of vertical earth, though only a few inches high.

My inquiries have been extended further than my own vicinage, with the like results. In no instance when fall ploughing has been accompanied by harrowing, and more especially with *liming*, have I found a failure of effect on the grubs. The extraordinary ravages of those reptiles having caused much sensation this season, led me to aim most at this object; which is only one of the benefits of this highly advantageous operation. I have found in some instances, that *fresh lime* was efficacious even with *spring* ploughing. As to the origin of the cut worm, I could discover no general agreement, or certain data, on the subject; though many are endeavouring to fix the parent of this destroyer. Those who allege that it produces a

fly, are most probably deceived by the *ichneumon*, bred in the grub.

Few of the members entirely escaped the fly. But they knew so well, that it is idle to sow wheat without manure and good farming, that in general the fly has done them little injury, save where the grain was *too late* sown, i. e. in the first or second week in November. Such wheat, in two instances, having grown little till spring, was destroyed by the spring brood of the fly. Others generally sowed the first week in October; and yet so variant are facts, owing to accidental circumstances, that a farmer had a great crop of wheat on potato ground, sowed the 22d of November, not in the least injured by the fly.

I have thus detailed a short history of *facts*, as reported by practical men, because it will not only be positively useful; but it will afford a specimen of the advantages which would accrue to the general interests of husbandmen, if agricultural societies, in various parts of our country, would communicate with each other, on subjects interesting to farmers; and to every citizen, equally concerned with them, in this important branch of the public prosperity.

I am truly yours,

RICHARD PETERS.

ROBERTS VAUX, ESQ.

A member of the Society states, that when the full grown grub is in vigour, *lime* will not destroy it. I have confined them in slacked lime, and found them very uneasy; but several hours' abidance in it has not materially injured them. The experience of others has been different—*fiat experimentum*. Possibly *lime* is most efficacious when the grubs are in the egg state; or in early stages of their growth.

R. P.

Hessian Fly ; Grain Moth ; Cut Worm.

Philadelphia, October 30, 1817.

Sir,

It seems probable that the eggs for one of the broods of the Hessian fly, are deposited in the stubble, or young shoots about the old stalk of wheat ; for, that the insect evolved in the spring, is so long lived as to deposit eggs in the autumn, is hardly credible ; if this is the fact, it follows, that destroying the stubble by burning, &c. would also destroy the superabundance of these insects. The experiment is well worth trying, and if done by farmers simultaneously, wherever these insects have appeared, the probability of success would of course be still more obvious. Perhaps *ploughing in* the stubble, or *rolling* it, would answer the same end if done at the proper season, or proper state of the weather.

I have not carefully examined the grain moth, though it is to be found here plentifully, in the grain loft of every brewery, in the warm weather. I will certainly attend to it in the proper season, but at present I will observe, that it most probably is a naturalized foreigner, and not an indigenous insect ; if so, it may be the *Tinea granella* which is the pest of corn lofts in Europe. Its wings are described as marbled with grey, brown, and black, a little elevated behind, and with a white head ; its larva unites the grains together by means of its web, forming a sort of tube, from which it occasionally ventures forth to devour the grain. Upon recurring to your letter, I

find you allude to a very different grain moth from the one above mentioned—one which in the larva state feeds like the curculio, within the grain ; this may prove, on examination, to be the same, or at least analogous to that species of the genus *Yponometa*, which we are informed commits such ravages upon the grain in the south of France. I do not recollect to have seen it.

Mr. Brattle is no doubt correct in his statement about the *cut worms*. I do not know where the parents deposit their eggs, but as all insects, (however different may be the food of their immature progeny from their own,) in this important act consider the appetites of their offspring, and also their convenience, by placing them in immediate contact with their food, it may be inferred that the oviposit producing the cut worm, must be at or near the roots of the grass, where it would be destroyed by burning, as you have mentioned, or by exposing them to the action of the frost by ploughing.

I hope to have the honour, at a future day, when my knowledge of insects shall be more mature, to communicate some observations to the highly useful society over which you preside, as will be consistent with its views towards promoting the agricultural knowledge of our countrymen, which from obvious causes is becoming every day of more vital importance to them.

Very respectfully, your obedient servant,

THOMAS SAY.

HON. RICHARD PETERS.

*On the Improvement of Land by the use of Shell-Marl.**Talbot County, Md. Dec. 31, 1817.*

Dear Sir,

I received your letter of November 10th by mail, and should have answered it sooner, but it has not been in my power. For twelve months past my health has been very precarious ; I have not, in that time, been as far as Easton on any business. The whole, almost, that I am capable of doing, is to ride out on my farm, in good weather, for exercise, and to see how the business is carried on ; and I can scarcely at times even write my name legibly, and very seldom can write a letter. Your goodness will therefore excuse my seeming inattention to you. I will endeavour to answer your inquiries as well as I can, and it will give me pleasure, if my answers are such as may be satisfactory to you.

Your first question is, whether what I use be marl, or soil mixed with shells.

Whether it be marl or not, I will not pretend to determine, as I have seen no description of marl that answers exactly to it ; but Mr. Tench Tilghman informed me, he had seen a description of marl used in Scotland, exactly similar to what I use on the farm on which I reside, and which is the improved land you mention. I have not seen the account myself. However, this, and all mixtures of broken marine shells, of which there is a great variety, are now denominated marl, here. What I consider the best, and which I most use, is composed

of small parts of marine shells, chiefly scallop shell, about one-eighth of an inch square, or somewhat longer or smaller, with scarce any sand or soil with it: some of it seems to be petrified, and is dug up in lumps, like stone, from four or five, to forty or fifty pounds in weight, hard to break even with the edge of an axe, and will remain for years, tumbled about with the plough, before it is entirely broken to pieces, and mixed with the soil; indeed you may observe it in some parts of the bank, where the soil has been washed from it, appearing like rock stone; but if broken and pulverized a little, it effervesces very much with acids. It lies from three to five and six feet deep, from the surface of a light or sandy soil, on the banks of the cove, but how deep the marl, or bed of shells goes, we cannot ascertain, having never dug through it. When we get from two to four feet deep into it, the water springs, so that we have never gone deeper, but fill up the hole with the surface soil, and open another. It does not lie level, but waving, sometimes dipping so deep that we lose it; nor is it of one colour, but some white, like dry mortar, some the colour of yellow ochre, some red, like red ochre, and some blueish: but I do not know any difference in the quality, from the colour. In digging, it is generally loose and crumbly, but mixed with hard lumps as above described: we find sometimes whole shells of scallop, oyster, and barnicles. The kind I estimate most, is of the foregoing description, and I am of opinion it lies at different depths, under the whole of this peninsula, which has been gained from the water, and that the shells are of the different kinds of fish which inhabited the waters while they covered the land. In some places, at heads of coves, I have traced the shells

by cutting a ditch from three to five feet deep, down the valley, and even through the marsh, till I came to tide water; but in this kind of low ground there were more whole, and larger shells, and none of the large, stone-like lumps above mentioned. It appears as if it had been the bottom of the creek, and as if covered by the water more lately than the first described: all these are on this farm. At my other farm, where my uncle formerly lived, and which is at the head of this creek, I find it by digging deep into the ditches, in the meadow ground, which empty into the head of the creek: but that kind differs from what I have here; as, besides the scallop shells, which are not so much reduced as here, there is, for perches together, the clam shell, perfectly whole, but so soft, that when thrown out of the ditch and exposed to the air, they soon fall away to powder: but the scallop shell seems most abundant; and of this kind of shell-fish we have no knowledge. The beds of shell are to be discovered in many places, on the edges of the creek, and even out into the water; and are found throughout the county, in most places where carefully sought for, but generally, I believe, a good deal mixed with sand. However, I have no doubt they may all be usefully applied as improvers of the soil: they are now coming into the use of many persons in this county, who have discovered them on their land, and have adopted a regular system of manuring.

Your next question is, to what kind of soils, and how it is applied; as a *top dressing*, or *ploughed in*?

I have applied it to all the soils on my farm, some of which is a cold white clay, and wet; others a light loam, and sandy. I find it useful to each kind, and manure my

land all over with it, without distinction, and to advantage; putting a smaller quantity upon the looser soils. I have applied it as a top dressing on clover, and also where clover has not been sown; with a view to improving the grass, and also to be satisfied whether it would not be best for the ground, to let it lie spread on the surface, for a year before the ground was put into cultivation; but it has not answered my expectation. I could not perceive any advantage from that mode of application. I now constantly apply it to the ground cultivated in corn; carting it out in the winter and spring, and putting on from twenty to forty cart loads per acre, according to the ground, and the previous quantity that had been put on, in former cultivations, dividing each load into from four to eight small heaps, for the greater ease in spreading, according to the size of the load. Some is put on before, and some after the ground is broken up, but it is all worked into the soil by the cultivation of the corn, and it never fails of considerably improving the crop of corn, as also the ground wherever the marl is, especially in largest quantity. There is a small green moss, and black moist appearance, on the surface of the ground, when not cultivated; as you perceive about old walls, and in strong ground. Though the preceding is the common mode in which I use the marl, I do not think it the best; I mix some in my farm yard, with the farm yard and stable manure; and would prefer mixing and applying all that I used thus mixed, but for the labour of double cartage, which I cannot as yet accomplish, manuring so largely as I do. I cultivate one hundred acres yearly, and constantly manure the whole of what I cultivate; employing only four carts, and four hands with

the carts, which do all the manuring and carting on the farm.

Your next question is, what has been my rotation of crops, and mode of cultivating, since I have used this manure?

Since I began to use the marl, and bend my attention to improvement by manure, I have cultivated only corn and wheat, sowing my ground in clover, and using the plaster. Instead of cultivating all my ground in corn, and sowing wheat on it as heretofore, I divided my cultivation into two parts of fifty acres each, putting one part into corn, which I was able to accomplish manuring time enough for the corn, and making a fallow of the other part, manuring as much of it as I could accomplish before the time for sowing wheat; and disregarding, in a degree, all smaller crops, which I could not attend to, as an object, without increasing my number of hands, and interfering with the main business. I went on in this manner, till I found I could easily accomplish manuring one hundred acres and upwards, per annum: having got my ground to that state that I can risk making a crop without manure, I am now about discarding fallow, being able to manure my whole hundred acres time enough for cropping in the spring, by beginning to manure for the next year as soon as the spring manuring is finished. I shall in future have no wheat in fallow, but sow it after corn and other crops, from which I am satisfied I can make more from my ground than by naked fallow, which I always considered unprofitable, though you made more wheat, except for the advantage of having more time to manure. The standing annual force on my farm is eight hands (men) with one hired by the month: of these hands

four are employed with the carts; two in ploughing, harrowing, &c. for the cultivation of the crop; and the other two or three, as may be, do the blacksmith's and carpenter's work, as also the fencing and other work necessary on a farm: the six hands employed with the carts and ploughs, are not taken off for other business, except in the time of harvest, and sowing wheat, when they are probably stopped. *I do not work so much with the plough as formerly, but more with the harrow, which lessens and quickens the labour of cultivation, keeps the ground cleaner, and, I think, in better tilth.* Occasionally I hire or employ some women, for hoeing work and spreading manure. I flush my ground in large lands, and harrow and roll as it may require; then, instead of listing, as common, mark it out each way with a plough, *very shoal, so as not to disturb the grass ploughed down,* and after dropping the corn, cover it with the plough or harrow, *and immediately put in the harrow,* keeping it going, as the weather will permit, till just before harvest, when we plough the ground, and finish the cultivation with the harrow, except something should occur, making it necessary to plough again after harvest. This I have found the best mode of cultivation for corn. I plant my corn about four feet apart each way, and have from three to five stalks in a hill, or cluster, for I endeavour to keep down the hill, and have the ground *as level as possible.* In saving my corn crop, I cut it up, without pulling it from the stalk as usual, and cart it in all together, then husk it out, leaving the husk to the stalk: I lay these near my feeding yard, and throw them into it twice a day: this gives us a large quantity of strong healthy food for the cattle, which serves them all winter, and keeps

them in good condition, without any other food ; makes a large quantity of excellent manure, and a fine dry feeding yard. As opportunity can be found, we cart marl, fuller's earth, clay, and any good soil that is convenient, into this yard, which being mixed with the stalks, and straw, or any thing else, penning the cattle on it through the winter and summer, instead of penning on the field, in the common way, we have a large quantity of manure to go out in the fall, and next winter ; it is put into the field, in the intermediate rows, between the rows of marl, as far as it will go, and they all get mixed in the cultivation. We also convert the scouring of our ditches, the head-lands of the fields, and all waste-ground that we can, into manure, by carting litter from the woods, yard manure, or litter, &c. &c. and mixing with them ; so that I can nearly, or quite, now, accomplish making farm-yard and this kind of manure, sufficient to go over my whole hundred acres, annually. For the two last years, I have made more manure than I could accomplish or effect carrying out, though I have manured from ten to twenty acres more than my hundred, each year, with part marl and part farm-yard, but not the whole with both, as I hope to be able to do in future ; but it will be necessary to increase my carting force to effect it, and I clearly see, I can raise sufficient manure for the purpose ; heretofore I have manured my corn-ground, fifty acres, with marl, and my fallow with part farm-yard manure, and part marl, as mentioned before ; so that you will perceive the improvement made on my soil *has not been effected by marl alone*, but in conjunction with farm-yard manure, clover, and plaster, and *by making it a point to manure with something all the ground I put into cultivation ;* so

that every time I cultivated a field, that field was improved, and not in any degree impoverished by the cultivation. By this means, and the Divine assistance, I have effected that improvement of my farm, which is so very striking to the observation of every person acquainted with it. I can say nothing as to the comparison of crops, before and since my improvement; it has been a progressive thing for many years, and, till I adopted the present plan, I was an experimental farmer, trying every thing I met with in books, or heard of; so that there is scarce any rotation of crops, or mode of cultivation, but what I have tried.

This, I believe, will answer all your questions, except as to the time when I began to use the marl, and how soon I experienced the beneficial effect of it?—being your fourth question.

In August, 1805, in digging down a bank on the side of a cove, for the purpose of making a causeway, I observed a shelly appearance, which it struck me might improve clay soil; I took some of it immediately to the house, and putting it into a glass with vinegar, found it effervesced very much; this determined me to try it as a manure; accordingly, in September, I carted out about eighty cart loads, and put it on a piece of ground, fallow, preparing for wheat, trying it in different proportions, at the rate of from twenty-seven to about a hundred loads per acre, and the ground was sown in wheat: I could not, myself, be satisfied that there was any difference through the winter and spring, although general Lloyd, who was viewing it with me in the spring, thought he could perceive some difference, in favour of the marl; but at harvest time, the wheat, though not more luxuriant in

growth, or better head, was considerably thicker on the ground ; and, after the wheat was taken off, the ground where the marl had been put was set with white clover, no clover being on the ground on either side of it. The next year, 1806, I discovered it in the drain into the head of the cove, which I immediately ditched, and from the ditch put out seven hundred loads, on the fallow ground ; the effect, as to the wheat and clover, was the same, (this was put, for experiment, at the rate of from forty to a hundred and twenty cart-loads per acre,) though the marl was not of the same kind as the other, but more mixed with sand and surface soil, being taken from the low ground, by ditching, and all mixed together. I also tried it on corn ground, spread out as above mentioned, and found the effect immediate, as to the corn, and in the same manner as above described, as to the wheat sown on the corn ground ; this induced me to persevere in the use of it, which I have done ever since, adopting the mode I mentioned before, and putting it at first from forty to seventy loads per acre, till I have now come down as low as eighteen or twenty loads per acre, going the third time over the ground with it.

I believe I have now answered all your inquiries, as well as I can, except as to the average comparison of the past and present crops, which I cannot well do, for the reasons above given, and also that my fields are entirely changed, neither containing the same grounds, nor the same quantity of ground in each ; but I believe I shall not be much out of the way, if I say, that I think the soil now capable of producing between two and three times as much, per acre, as it would before I began to use the marl ; and though the marl has not solely pro-

duced the improvement, yet the improvement would have been far short of what it is, if it had not been for the marl, which has contributed, in a very large degree, towards it; and no small matter in favour of the marl is, that, by the blessing of God on my endeavours, I have, in twelve years, been enabled to improve three hundred acres of ground, to the pitch that these are, and am now in a fair way of increasing in the same ratio that a snow-ball increases as it is turned over.

I fear you will not be able to read, and hardly to understand, this tedious letter, in many parts; if you can, and it is in any degree satisfactory to you, I shall be compensated, and will cheerfully answer any inquiries, in future, that you may wish to make. The first favourable opportunity, which may probably be by some friend, in the spring, I propose sending you a small bag of marl, which may be more satisfactory than any description.

With every sentiment, &c.

JOHN SINGLETON.

HON. WILLIAM TILGHMAN.

On reclaiming, improving, and cultivating Salt Marshes.

Belmont, March 25, 1818.

Sir,

I have been gratified for all the pains I have taken to procure the very valuable and instructive communications relative to the improvement of salt marsh, from general *Swartwout* and his brothers; through the instrumentality of Dr. *Hosack*. *John R. Coates*, Esq. has completed the subject; also from actual experience. Both these communications, on a new, and hitherto unexplored topic, will be highly prized by all who are engaged in such enterprizes; because they warn against imprudent undertakings; and instruct those who contemplate practicable and profitable improvements. To those not interested in such property, the details may appear unimportant; but they are, in my humble opinion, invaluable to adventurers in similar pursuits. On a careful perusal of them, I cannot satisfy myself with any abridgment I have attempted to make. Having been communicated to the society, as they came from the hands of my very obliging correspondents, I think it best to suffer them to remain entire. Not only the operations required in the preparation of the soil, but some sound agricultural principles, and economical arrangements are developed by Mr. *Coates*; and the clear and strong light thrown on the subject by Messrs. *Swartwouts*, entitle them to our grateful approbation. Yours very truly.

RICHARD PETERS.

ROBERTS VAUX, ESQ.

New York, February 15, 1818.

Dear Sir,

I have the pleasure to enclose a reply to your favour, relative to the process employed in reclaiming the salt marshes in the vicinity of our city. General Swartwout and his brothers, who have engaged in this enterprize, unite in this reply. It is my intention to add to this information the observations of another gentleman, to whom I shall submit the contents of your valuable letter.

I have carefully watched the progress of the improvements of general Swartwout, and am convinced that they will prove successful. If I possessed the means, such is my confidence in the plan they are pursuing, I most cheerfully would have united in the undertaking. Our citizens in general want faith upon this subject; but I am persuaded that each year's cultivation will evince the correctness of the views of the present proprietors.

Your letter* and the reply to it, in my opinion deserve publication, in as far as they may prove the means of cultivating the numerous inlets of our seaboard. The moment I receive any additional information, it shall be forwarded to you.

I am, dear sir, with great respect, yours,

DAVID HOSACK.

HON. RICHARD PETERS.

* I have retained no copy of the letter I wrote to Dr Hosack; otherwise it would have been published. The time I devote to such subjects is, in a great degree, stolen from other, but less agreeable occupations. I regret that I cannot comply with his polite intimation; as the letter seems to be deemed important by those who are better and more experienced judges of its usefulness, than I have any pretensions to consider myself. The effect it has produced, amply rewards all my endeavours. R. PETERS.

Hoboken, Feb. 12, 1818.

Sir,

We have perused, with great attention, the interesting letter of Judge Peters to you, making inquiry on the subject of the reclamation and cultivation of salt marshes, and which you were pleased to put into our hands a few days ago, with a request, that we would detail the mode adopted by us upon the marshes in the vicinity of New York, for the information of your correspondent. This we proceed to do, and shall answer the inquiries in the order in which they are made. 1st. The nature and composition of the soil reclaimed? The soil is alluvial, a deep rich loam, clay, and some peat; ten to thirty feet deep; no sand or gravel. 2d. The embankments? These are placed twenty to forty feet from the edge of the river, on the firmest ground, and are sixteen feet broad at their base, five feet high, and from three to four feet broad at top, the sides faced with sods, cut from the marsh, near the river, and the body of the bank composed of the best mud, well packed. 3d. Ditches, drains, &c.? Our ditches are cut four feet deep, five feet wide at top, and one foot at bottom, which form prevents the sides from falling off, and permits them to be scoured with ease. Our drains are four feet deep; two feet at bottom, and eight feet wide at top; but almost all our ditches drain into natural creeks, which answer the purpose of reservoirs. We make no ditches parallel with the dyke, either within or without, believing that they weaken the embankment, and afford a shelter for the

muskrat. Our ditches are cut perpendicular to the dyke, and approach it to within about four perches. 4th. Rise and fall of the tide, floodgates, &c. ? Ordinary tides rise and fall about six feet, to which depth, if necessary, we could drain the marshes. Our sluices are of the simplest construction, very substantial, and seldom require attention or repair. They are thus constructed ; heavy sills are laid down, a foot below low water mark ; a strong frame of timber is mortised into the sills, and supported at top by braces ; wings faced with plank, and the whole frame is filled with soft mud, to prevent its leaking ; the race way is about four feet square, and planked, and both ends of the floor of the race way are *spiled* with plank to prevent its *blowing*, and the gate opens and shuts with the fall and rise of the tide. We have avoided sluicing natural creeks, but have stopped them off with timber and plank, and carried the dyke over them, placing our sluices as near them as the nature of the ground would allow. Sluices put into creeks are never safe, are very expensive, liable to settle, to blow, and be forced from their position. 5th. Cost of the banks and ditches ? The banks were constructed under our own personal inspection, by day and week labour, at one dollar and fifty cents per day, and the business was new to us. At this rate, they cost about ten dollars per perch. We could make them now for seven. They are not exposed to uncommon assaults from surges, storms, &c. The labour of dyking and ditching was performed exclusively by Irishmen, who used the American ditching spade, and a three-pronged fork. Wheelbarrows were much used, when the distance was too great to throw the sod with a fork. Ditching

was done at various prices, until, by a fair experiment, we brought the labour within calculation. Our main drains cost about one dollar and fifty cents, per perch, while the ditches averaged thirty-seven and a half cents; they could now be cut for thirty cents per perch. The average cost for dyking, draining and sluicing, we estimate at twenty-five dollars per acre. Having thus explained the mode adopted by us in draining and enclosing the grounds, we shall proceed to answer the sixth inquiry, to wit: The steps taken, and the success of them, for bringing the drained marsh into profitable culture? And here we must remark, that we are yet in a course of experiment; when we purchased these marshes and commenced their reclamation, we possessed no practical knowledge of agriculture, nor could we find a person, upon whose experience in marshes we could rely, to direct us in our operations; hence the necessity of various experiments to ascertain the best mode of bringing them into profitable cultivation; these we will detail, in the hope that others, who may be engaged in similar improvements, may profit by our experience. We shall commence with experiments made on the Hoboken marsh, which was embanked, sluiced and ditched, in the spring and summer of 1814. This piece of ground contains about three hundred and twenty acres, situated upon the Hudson river, and opposite the city of New York, and is what is usually termed *salt marsh*, the water here being nearly as salt as the ocean. Upon a small piece, near the centre of the marsh, prepared by cutting the sod, some peas, beans, onions, beets and other vegetables, were sown in the month of May, of that year: they all

came to maturity, and were of excellent quality. In the spring of 1815, we ploughed about ten acres, which was planted with Indian corn; about the same number of acres were also planted with corn in the sod, without ploughing: they both succeeded well, no difference in the yield, which averaged about forty bushels to the acre; but our superintendant believing that ploughing was necessary to bring the marsh into fresh meadow, ploughed in the autumn, near two hundred acres more, which was exposed to the winter's frost: we had also sown some grass seed the same season, on the sod; it took but partially. In the month of May, 1816, we planted Indian corn on about one hundred and fifty acres of the ploughed ground; the *frost* and *worm*, with an adverse season, destroyed nearly the whole crop: we gathered less corn that year, than was produced the preceding year from five acres; about forty acres were sown with oats, they grew well and gave a great yield; it was evident that oats were the best thing we could put into the ground, for a first crop: it was now discovered that much of the timothy, sown the preceding spring, had taken root, which circumstance, together with the discouraging appearance of the corn, induced the decision to sow grass seed throughout, which was accordingly done that season, in the months of September, October, and the beginning of November: that part which was sown before the first of November did remarkably well, producing, the last harvest, on some lots, full two tons of timothy hay per acre, and, on the average, more than a ton; the late sown did not take or do so well, but we made full three hundred tons of timothy hay, from this

meadow ; it grew very rank and stout, the heads, on an average, six inches, and many nine inches, and even twelve inches long : the lots upon which the grass had but partially taken were re-sown, and the whole, when winter set in, promised a full crop the ensuing season.

In October, 1816, a lot, of about four acres, was sown with wheat ; the ground was low, the winter cold and wet, and the greater part of it froze out : it yielded about twenty-five bushels of grain, of the best quality and first appearance : on some lots, where the grass seed had not taken well, we harrowed, and sowed oats, in April and May last ; they did uniformly well, and would have produced full forty bushels per acre, but we lost more than half the crop, by the August storm ; we cut the stubble high and *burnt* it preparatory to seeding the ground ; we put about two acres into wheat and rye, and no grain could look better than it did, when the winter set in ; the remainder of the oat ground we laid down with timothy.

We commenced dyking the Newark marsh in the spring of 1815, and that season embanked and sluiced one thousand nine hundred acres, north of the road leading to Newark, and distant from New York about four miles : the next summer we ditched near a thousand acres of this tract, which is not, strictly speaking, a salt marsh : the waters of the Hackinsack and Passaic rivers are fresh one-half the year, and but slightly saline the remainder : the indigenous vegetation of the marsh is common flag and water-rush, some blue grass, and a stout, rank, three-square grass, none of which grew on the Hoboken marsh, which was covered with sedge ; the soil is

consequently less impregnated with salt, the sward is not so tough, and sooner decays when drained : on this ground the grass seed took root, and grew well, but four months after the drains were cut, and one year after it was enclosed : this was on lots over which *fire* had passed. Indeed nothing more seems to be required to prepare this ground for grass, than the simple operation of burning the vegetation on the ground, as early in the autumn as it will take fire, sowing the seed on the sod and harrowing well after : the addition of a roller would no doubt be of service : in this manner, two lots, of about ten acres each, were prepared last October, and sown with wheat and rye, and when winter set in, no grain could look more promising than it did : about four hundred acres of this tract are now in timothy, which promises a full crop the next season : clover and herd-grass thrive equally well on this ground.

In a word, the result of our experiments, thus far, is conclusive, that the least expensive and best mode of subduing the sod of marsh land, and bringing it into fresh meadow, is to let it remain a year, or more, after it is banked and drained, then to burn the indigenous vegetation on the ground, and harrow in grass seed, or commence with a crop of oats. Having tested the practice to our satisfaction, we shall pursue it hereafter, until experience points out a better mode.

It appears that we have about seven hundred acres, now laid down with timothy, promising well, and that six hundred acres more are in a state of preparation, and will be laid down with grasses, in like manner, the ensuing season : nine hundred acres, in addition, are embank-

ed and sluiced, but not drained, and about one thousand four hundred acres are yet unembanked, and in its natural state, the improvement of which is delayed solely for the want of funds; the moment they are obtained, we shall proceed in our labours, until the entire tract is enclosed, drained, and brought into profitable improvement.

Accept the assurances of our highest regard.

JOHN SWARTWOUT,

For self and Brothers.

DR. DAVID HOSACK.

Philadelphia, February 28, 1818.

Dear Sir,

The request you did me the honour of making, for any information I might possess relative to salt marshes, was too flattering to be declined; and as the subject has never been examined in America, where such marshes require different considerations from those of other countries, I fear you may startle at the length of this communication:—any part of it is at your disposal.

There are many large tracts of salt marsh on our coast, within the bays, inlets and rivers, susceptible of such improvement as will amply compensate a cautious adventurer, render those districts healthy, and add to the revenue, for county purposes.

I presume that all salt marshes are formed in the same manner, and from similar materials; and that the superficial appearance is nearly alike in every country; producing the same herbage, with trifling variations, arising from the altitude of the ground, and the difference of climate.

Whenever there is a rain that washes the soil from the land near rivers, whenever pieces of the banks fall into rivers, and whenever the channel beds are disturbed by storms, the lighter particles of earth are carried up and down the stream, and kept in motion to the distance of a few miles or hundreds of miles, sometimes settling, and again being disturbed, till they reach a cove near the shore, or some rock or hard shoal near the channel, where the agitation is so diminished, that the floating motes may gradually fall and stick to the bottom; subsequent rains

and storms add to the depository, until this alluvion rises above low water mark ; and being then more or less under the influence of the sun and atmosphere, it gives birth to docks, reeds, grasses and mosses, of various substances and properties, according to the quantity of heat or moisture, or to the operation of some other agents in nature. This herbage arrests the particles of mud floating over and through it, when the tide is high enough to cover the flats, and detains such portions as have sufficient gravity and adherence to resist the impetus of the current: hence, in some places, the mud-flat enlarges its dimensions, in width and height, till the height is that of high water mark ; and, in other situations, the force of water, in more rapid transit, carries away, at a single tide, whatever had been left the preceding one ; such force being just sufficient to allow the shoal to rise to a certain height, and no higher : this may account for the lowness of the Pea Patch and Reedy Island, at the head of Delaware bay ; while the opposite marshes, on either shore, are raised to the level of ordinary high tides.

The wild grasses have never been properly classed ; and for want of a nomenclature, as well as from a lamented deficiency of science, I am unable to represent the several aquatic plants ; but as grasses and soils are so intimate, I must note some of the most predominant of those, that my account of these may be intelligible. I shall not attempt to assign a reason for the difference of vegetables that grow on salt marsh, from those which spring from fresh mud, barely stating that there is a difference, and that the grasses of the former are much more abundant, and in their natural state more useful, as they afford tolerable pasture for cattle. The great-

er quantity of herbage than fresh marsh produces, and which is constantly rotting, *yet held* by strong roots, and growing again, may account for the more evident union of vegetable and mineral materials in the soil: the reed on fresh marsh dies early in the fall; is frangible, and *floats away* in a few successive tides, without incorporating with the soil. There are three grasses more prevalent than others on salt marsh: one is a long tangled grass that takes root in the sand, as soon as a thin layer of mud is formed upon the latter, at or below low water mark, and grows where the water is generally clear; it becomes tangled by agitation, catching small portions of floating mud, by which it acquires as much consistence as barely to deserve the name of land. After growing above low water mark, and for a few inches below its own surface, it is solid enough to bear a man; who, by jumping, may shake it for several yards: an inexperienced person would suppose that this kind of marsh might be banked to advantage. It has been tried, near to Alloway's creek, in Jersey, where the *bank* formed of this vegetable earth decayed, and settled even with the marsh; it was so loose as to become saturated with water as the tide flowed; at every recession of which, the sun rotted and in a few years reduced it to its former level. Soon after the bank was thrown, and the ditches were cut, the *meadow* was dry, but in a year or two the whole body became decomposed; and, for want of mud, or of water sufficient to buoy and sustain it, settled so low that rain water would not run off—there was no fall—thus it became worthless. Then the turf bank rotted, or floated off, and the expense was entirely fruitless. The second species of grass requiring notice is called, in Jersey, “Sedge

Grass:" it has a succulent root, resembling that of a leek; it takes hold two or three inches below the surface of the marsh; the blade is about a foot high, is broad, tender and nutritious; its verdure is nearly perennial; hay is often made of it in January; it does not grow close; it flourishes in a rich black soil, composed of the finest particles of mud, and in places where the marsh has not raised quite to the height of ordinary tides. From this cause, sedge marsh (unimproved) is generally too soft for pasture, and the crop too liable to be wet, or carried away by the water, for hay-making on a large scale. The soil is strong, and from a foot to three feet below its surface, begins to be compact; the same kind of soil produces the three-square grass, so well known as to need no description. This marsh becomes excellent, after being banked a few years; but in considering the propriety of enclosing it, the adventurer must examine carefully, to ascertain whether the supra-soil or spongy substance be so thick, as to fall *greatly* when decomposed; the danger being in its settling so low that the back water, from creeks or from the clouds, will not fall into the bay or river; in which case it is worthless for fresh meadow, and worse than in its natural state. The rise and fall of tide must, of course, be taken into consideration; for although, where the rise and fall are six or seven feet, there will be no injury from the settling of the marsh as much as three or four feet, the same may not be said when the rise and fall of the river are only three or four feet. The last of these grasses that I shall mention, is called "Salt Grass:" it grows on the highest marshes of rich blue mud, its roots reaching the solid soil, at two or three inches below the surface,

and extending a few roots as low as a foot. Here the mud is solid for many feet, down to the sand or gravel, and in many instances as deep as the bottom of the river or bay; its depth varies, however, according to the superficial shape of sand or gravel on which it was originally formed: the salt grass (so called) is esteemed the best fodder for cattle, though not quite so good as the sedge for pasture, where the latter grows dry enough; nor is the hay so much esteemed *for sheep*, as is the sedge: it is a hard wiry grass, growing high and very compact; it may be gathered without much risk from tides, which seldom spread over the high marsh where it abounds. Where this salt grass, and even where the sedge grass prevails, the mud is so solid, at a little distance underneath, that water cannot percolate; and having no drains in the natural state, the water is stagnant, and generates certain vegetables that dissolve, and form a substance resembling a sponge; whose fibres are strong, compactly intertwined, and whose roots are very tenacious: this surface is cut into pieces smaller than bricks, and used for firing near New York: it yields heat rather more feeble than tan.

Having said that there are large tracts of salt marsh which might be improved to great advantage, it is quite as necessary to add that there are many, which never should be touched with that view. Where they are exposed to the open ocean, whose capricious violence inundates half a township one day, and casts a sand-bank to prevent the retrocession of water the next, and where the water is so clear that it serves only to nourish sea-weeds, without adding mud to make a substantial soil, no great improvement should be expected.

Marshes on sounds and inlets of the coast, are often exposed to that uncertain rise of the sea, and are situated so near it as to receive many of its attacks, while they are out of the reach of floating mud, which is deposited in quiet places, nearer the sources of the rivers. Our government would not undertake to improve those mudless flats, excepting for military purposes, while the western country remains untenanted; nor could the work be effected on a grand scale, while labour continues so high as it is at present. It is true, that Holland owes her existence and chief revenue to such works, but equally so, that she preserves them only by the most expensive vigilance. The first cost of machinery, and incidental expenses, would, and ought to be sufficient to discourage our government: individuals would inevitably fail in such extensive enterprizes. Whenever, therefore, a project of improvement is entertained by individuals, the chief inquiries should be:—

1st. Is there sufficient elevation of the marsh, allowing for its sinking, to drain it into the creek, river, or bay, to which it lies adjacent? and in estimating the probable diminution in the height of the marsh, the nature of the different strata of turf, grass or roots mixed with mud, and of the mud itself, must be considered. A spirit-level should be used to ascertain whether the *back part* of the marsh be high enough, as the *highest marsh is always next to the river*: without particular attention to this phenomenon, we might be greatly deceived.

2d. If the mud be not sufficiently tenacious near the site of the intended bank, where is the solid mud to be obtained, and what will be the cost of carrying it in wheelbarrows or on handbarrows? It must be understood

that the turf will not be fit for the bulk of a bank, though the *salt grass sod* is better than any thing else for facing.

3d. What will be the probable effect of *storm tides*; as they may overtop a low bank, or bear a weak one into the ditch? The last inquiry, which perhaps should be first, is particularly necessary in situations where no certain limits can be assigned to the tide at its height. On bays there are large tracts of good marsh, but some of them so exposed to storms that the greatest care must be had to considerations of the size, materials, and cost, of a *suitable* bank; the nature of the beach at high and low water; whether it be shelving or abrupt in its descent; whether it be composed of sand, gravel, or mud; and whether the marsh gains upon the bay or the bay on the marsh? Opposite to some marshes there are high mounds of sand or gravel thrown by the surf, whose materials sink at the reflux of the wave; they cannot float over the marsh as particles of mud in diffusion would, but are left at the edge, as high as any *storm* tide casts them; thus forming a natural defence to the marsh, sufficient for its protection against all common tides. This natural mound, however, is sometimes destructive, at others defensive, to the meadow; defensive, where there are creeks from the upland that ebb and flow in their connexion with the bay; for, in this case, the back water may be collected, at any time, to *force* a passage, through which to drain the meadow, at low tide; it is destructive, where there is no creek rising in the fast land, for the natural mound keeps all the rain water from falling into the bay; and though a drain may be dug to carry off the water, through the beach to

low water mark, a few high tides will fill up the mouth of such drain, and the next storm tide, probably, replace the sand as high as ever : there is no chance, in such a place, of making good meadow, without machinery to raise the back water so high as to be sent *over* the natural mound.

It was just now observed, that where creeks, from the fast land, pass through the meadow, there is advantage in having this natural mound. It is a protection to the artificial one, which must nevertheless be thrown from the solid mud inside of it ; and it should be raised as occasion requires, by putting a slab or brush fence in every low place that storm tides may have broken, or the winds blown away. The fence would catch the loose sand blown from the beach, when dry, at low water ; as well as that which the waves might otherwise throw into the meadow, beyond the regular line of the natural mound. Too much reliance on the natural mound must be avoided, lest the artificial one be neglected. A bank of sand, alone, will never be safe ; for the rooting of a hog, or the track of an ox, may let the bay water through, and thus begin a breach that will enlarge must faster than if the bank were of mud. Other inquiries must occur to a prudent man, such as, what is the quantity of marsh to be enclosed, with reference to the profits in comparison with the expenditure ? the probable amount of interest on capital, till the land be cultivated or brought into fresh grass ? the population of the neighbourhood, in relation to the demand for hay or grain, and the price of labour ? the distance from market ? the facility of procuring fresh water for cattle ? the laws of the state, which should impose a bank tax, pro-rata, for repairs ? &c. &c.

Some marshes, where there is no sloping beach, are washed at their edge, next the river or bay, by ordinary tides, *all the time of flood and ebb*—no sand nor gravel to defend them : in such a case, no bank erected near the margin will stand long, but will, in a few years, be undermined and cave in ; great pieces of sod are constantly breaking off, carrying some mud along with them, and this process never ceases, excepting at the turn of tide, to make regular approaches towards the artificial bank : nothing can justify enclosing such a marsh, unless the owner can make safe calculations on the plan of going far back into it for the site of his bank, and thus losing several hundred yards in depth between it and the bay ; and even then, he must look forward to a time when the encroachment of the bay will compel him to abandon his out-works : to prevent this, however, piers or old hulks have been resorted to with success, but always with great expense. The uncertainty of the effect of such barriers is another objection, as they frequently increase the evil they were placed to forfend. There are some valuable tracts, fit for banking, in whose centre, or extremity next the fast land, are soft low places of considerable extent : in order that the improvement of the whole need not be retarded, till the tides should fill up these low spots, which, from their remoteness from bays or rivers, might never be, the owners could assist nature, by digging ditches from such bays or rivers, through which the muddy water would readily flow and spread over those low places, which are commonly called “ salt ponds ;” three or four years would, by this method, effect a great alteration : this cannot be done after the bank is made, without inundating all the land enclosed.

Many of the foregoing remarks apply, with most effect, to *large tracts* of salt marsh; and, in this view of the subject, it appears proper to advert to the difficulty of procuring fresh water for cattle, when the meadow shall be prepared for grazing: the subject is mentioned now, because we are considering the propriety of banking, with an eye to the expense as well as the profit. It is common for the marshes to extend two, or even three miles from the fast land to the river or bay; and, where no fresh streams pass through, there are but two expedients: one is, to build a platform or slip, for cattle to descend upon to the river, *at low tide*; but this can be useful only where the water is merely brackish—brackish rivers being potable at that period: the other is, to have a well so constructed as to obtain fresh and exclude brackish water; the best mode of accomplishing this has been practised within the fortifications of the Pea Patch, a low marsh island, near the head of Delaware bay. An iron cylinder, about four feet in length, whose rim is an inch and a half thick, and the diameter three feet in the clear, is put into a well in the salt marsh, when dug to the depth of half a dozen feet; the cylinder sinks into the mud, and another one is placed upon it; a man descends to dig the mud from around the rim and from the middle, by which means, and the weight of iron, the cylinder settles; and thus joint after joint is put on, till the spring below the surface of sand or gravel is found as fresh as those in upland. The joints of the cylinder are not made with grooves, but they effectually exclude any water that would otherwise ooze through the mud into the well. Few wells in salt marsh need be dug deeper than ten feet below the sand or gravel on which the marsh

is formed; and it is presumed that twenty-four feet would be the mean depth required in high marshes on the Delaware. The cost of the well at the Pea Patch, was, per contract, forty-five dollars per foot, including every expense; but it is supposed that the work might now be done for half that sum:—a thousand dollars would be well spent in obtaining fresh water in a large body of meadow, remote from the fast land.

Having determined to bank and reclaim a *large* tract of marsh, for that is still the hypothesis, let us inquire what is to be done at first, and in progress? The first step is to ascertain the quantity owned by others, in order that if the state laws do not compel every owner to pay the expense according to his quantity of marsh, the legislature may be applied to for a special act; by neglecting this, some of the owners receiving benefit from the enclosure, will probably refuse to pay their quota of expenditure: next, let contracts be made for banking and ditching by the rod (not by the day) under the superintendence of a person appointed to see that the packing be properly done, and the ditches cut as wide and deep as the agreement specifies. The banks should be thrown from a single ditch, inside of the site of such bank, unless where it is necessary to make one so large that the men cannot throw the mud from the inside of the ditch to the outside of the bank, and, in this case, if the mud can be carried for a reasonable price, it is better to have it done, than to have two ditches: one ditch is preferable, because the bank is not so apt to spread and fall into one, as if there were two; nor has it so great a tendency to sink, or spoil its shape, as it would have by crushing its footing into two ditches: it will be more free from musk-

rats, which delight to play in ground between two pieces of water : it will be more free from *fidlers*, by some called *soldiers*, which never go over the surface of grass into which they cannot penetrate, though they bore innumerable holes, of half an inch diameter, into the soft sides of the ditch, below the bank ; and if there are two ditches, they burrow from one to the other, and thus begin ruinous breaches.* And again, there can be no attrition from the tide against the edge, where there is but one ditch, *and that inside*. Where the expense will be justified by the quantity, and favourable situation, and uncommon value of meadow, as in that between Newark and New York, it would be preferable to have no ditch, but to *carry* all the mud from a place distant from the site : this plan was there pursued by Samuel Swartwout, esquire, the active proprietor of that most valuable estate. The sluices or flood-gates should be erected, in number and size, as the quantity of water indicates a small or greater vent to be requisite : respecting them, I wish only to remark, that they should be made solid, on logs, placed either end up, or on the side, across the sluice ditch, *as low as the tide will admit* ; this to prevent muskrats from undermining, from which cause the water within or without the meadow might cause the works to *blow* : if expensive flood-gates be made, a roof would preserve them for many years.

The size of the bank on salt marsh will depend on the situation, in reference to exposure ; but it must be also

* The *fidler* is an amphibious shell-fish, like a *craw-fish*, about the same size, and so called from carrying one large claw or pincer before it, when it runs, the claw being in about the same proportion to the dimensions of its body, as the *violincello* to a gentleman of the orchestra.

observed, that the footing should be wider, and the bank itself higher, than for fresh marsh, when first made, on account of the perishable vegetables that are more or less intermixed with the mud, of which the bank is formed. If the marsh be extensive, a main drain should be cut, as deep as the floors of the main flood-gates or sluices; and all the smaller drains should end in the main one, at different points; these need not be so deep, though they must be somewhat deeper than the turf or peat. The dimensions of ditches, usually made merely for draining, are six feet across the top, three feet across the bottom, and three feet deep; less than eight feet across the top will not turn cattle, nor is a depth of three feet sufficient for that purpose in dry seasons; cattle will *walk* over a ditch of less capacity.

I now take leave to detail my experience in the management of salt meadow, but by no means recommending others to follow the example. About eight years ago, I engaged, in company with J. H. Brinton, esquire, in purchasing, banking, ditching and reclaiming a large tract of salt marsh, in Jersey, on Maurice river, extending down to its mouth, and thence down the Delaware bay, to West creek. We began by banking about twelve hundred acres on the river, at and above the entrance; our experience has enabled us to perceive many errors in the first operations; but the benefits of the enterprise were so plainly developed, and the preparation and management so much better understood, that we threw another bank, the year before last, embracing four thousand acres, adjoining the first body; the two banks, united, extend about twelve miles; and the length of all the ditches, together, is upwards of one hundred

and thirty miles : it was easy, at the beginning, to compute the cost of the bank and drains, which upon paper appeared trifling, when compared with the expected advantages ; but all such estimates were fallacious ; the undertaking was new, the object very important ; and liberal ideas, in every stage, produced, in the end, an expenditure ten-fold greater than had been anticipated ; we had no guide among the inhabitants, no caution from adventurers before us, yet such were the allurements for lavish disbursement, that innumerable small sums, to accelerate the work, encourage farmers, or promote early experiments, were not withheld : the old adage, "*festina lente*," never intruded itself among our calculations : my own embarrassment therefore preceded my income, and obliged me to sell part of the estate prematurely ; which I mention to put others on their guard. Our next object was to place experienced husbandmen upon the property, to work it to the best advantage, *on our account* ; these were procured from Pennsylvania, with horses, wagons, ploughs, and every necessary implement for agriculture. In the course of the first fall we put in about three hundred acres of wheat and rye ; the grain was strewn on the ground, which had never been ploughed, and the harrow was passed over it frequently ; but such was the tenacity of the salt grass roots on the surface, that very little impression was made, and much of the grain, so exposed, was destroyed by birds ; the remainder took root and had a good appearance for a time, but not more than a twelfth of the grains were covered ; and those which were not, were raised on tender transparent roots, which supported the husk of the seed at about an inch above the ground ; the meadow appeared as if covered

with innumerable spiders of the long-leg tribe : these all perished at the first frost ; while such grains as were covered by the earth, however shallow the protection, survived the winter, *stooled* in the spring, wherever there was soft earth to creep into, and produced an amazing increase ; that is to say, the increase of covered grains was amazing, not that the whole crop was. A bushel of the wheat weighed sixty-four pounds, and it was all alike, except the common white wheat, which neither yielded nor weighed so much as the red-chaff bearded wheat. In its growing state, it was, and has been ever since, free from mildew, and we attribute this fact to the saline particles of the atmosphere.* The rye was more abundant ; for, being a smaller grain, more of the seed had fallen into the harrow-cuts, and there obtained shelter. The whole product of three hundred acres did not pay the expenses, by many hundred dollars, but the ultimate value of the soil was apparent, from the vigour and health of those plants that were covered from the weather.

In the spring, oats were sown in the soft ground, where it had settled so as to allow cattle to go over with a harrow ; and a better crop, it is presumed, never was seen ; the straw enormous, and the top well filled. Indian corn was put in other lots, with a hoe ; it grew in some places, but failed in most. Our workmen, without experience on a soil of this nature, planted *so deep* that the seed became rotten, by the water that had not yet filtrated to the ditches ; or *so shallow* that the sun dried it

* There is a common practice among shallopmen, to dash salt water on the sails, to prevent mildew.

up with the crust of dead grass on the top. In a small piece, however, selected for experiment, (about the fourth of an acre,) the crust was removed with a hoe and rake, and here the crop was remarkably heavy. The second fall having arrived, it was determined to put the same ground in wheat and rye, as before ; for we supposed that the sod was sufficiently rotten for the harrow to tear it in pieces. We were disappointed ; the most solid parts of the meadow still sustained the decaying roots of salt grass ; and where this was not the case, the horses could not walk, and oxen went with difficulty through the slough. It was perceived, that wherever the mud was lightest, the decomposition was most speedy ; and hence, as this light sedge-mud was the only kind that could be cultivated to advantage this year, the farming proceeded under great discouragements to the workmen, as well as to the oxen. The frequent plunging of these made them sullen, and the slow progress of the work disheartened the drivers ; while the musquetoës, whose number had not then diminished since the ditching was done, increased the vexation of both. These obstructions limited the operations of the fall to a smaller space than was intended ; but the ensuing summer brought an abundant harvest, as respects rye. We now discovered that *wheat* was a less hardy plant, and unfit for the loose marsh ; but that in every place on the solid salt grass marsh, where it had a covering, it thrived well.

In the second spring, oats grew again, as well as before, in the same ground ; and a small piece of flax yielded an ordinary crop. Indian corn looked stunted and scalded in some places, and most luxuriant in others.

The *grub worms** were very prolific under the salt grass sod, and attacked the seed as well as many of the stalks. Two lots, together about twenty acres, had been sown with timothy and clover ; others with herd-grass. The two first were flourishing while nourished by the showers of spring ; but the summer sun acting upon a dry surface of dying salt grass roots, communicated too much heat to the young fresh grass, which perished. It must be difficult, at any season, for new grass to obtain a footing among the established roots of the natives, which already reach the moisture so necessary for the sustenance of all ; and the former will not dispossess the latter, until these are destroyed by being constantly exposed to the sun, and deprived of the superabundant water on which their existence depends. Where herd-grass had been sown, it took well, and was pastured ; the ground improved as it settled by the weight of cattle. Herd-grass was not so much injured by superfluous water, as were other fresh grasses. This meadow is now as good for pasture or mowing as any other ; having improved *every year*.

The third fall arrives—more ditches have been cut—fresh weeds have spread over the ground, instead of salt and sedge grass, to a greater extent than before. It was concluded to let the property to the halves—owners paying for scouring the ditches. The Germans are tired of working with oxen—refuse to work to the shares—are discouraged ; and the lots are let to people of the neigh-

* If these grubs were of the same species with our upland corn grub ; this is a curious fact. *Salt* and salt water, in numerous instances, have destroyed the common grub in our corn fields.

bourhood. Worse farmers than those near the bays are not to be found. They are so fond of "birding," that we may calculate events of the morrow with the certainty of soothsayers—by the evening flight of wild fowl. They will leave their horses standing at the harrow, while they tend a hoop-net—or they will go "oystering," or "drumming" (catching drum fish) on the flats—or they doze in a batteau at night, a jug for a pillow,—a fish-line tied to the wrist; while their wives and children are more actively employed at home, in brushing away musquitoes with a turkey-wing. I mention these habits of the natives, as being fairly within the calculations that should be made, before a great improvement of salt marsh is undertaken. These pursuits are called "natural privileges," and under that head are justified many liberties, such as neglecting to harrow sufficiently to secure a crop for themselves or the owners of the soil, if a net is to be mended,—using the teams for bringing home fish, oysters, &c. &c. Notwithstanding all this, our amphibious tenants contrived to get in between three and four hundred acres of winter grain. Bad harrowing, light sowing, late season, cattle plunging, men complaining, did not seem to promise much; yet the grain looked well in November, better in the spring, and at harvest there was the most brilliant display in one body, that perhaps was ever seen in the middle states. The difference in farming was, however, quite apparent in various lots.

Succeeding years produced crops of winter grain nearly as good, but some injury was felt from the *frequent succession of the same kind of grain*—to this cause we ascribe the large proportion of *cheat* that grew up in

the wheat land. The last crop of wheat and rye was not so heavy, neither in straw nor grain, although our farmers improved as fast as the marsh—their idle habits have yielded to the incitement of golden harvests. They know how to live better, and understand that the best means to procure good food is to work for it. They give the preference to dried eels and potatoes, over dried eels alone; and acknowledge that corn-fed pork is more savoury than that which was fattened on king crabs.*

Permit me now to attempt to account for the deterioration of the crop of grain, (though the grass had improved every year,) at the same time admitting that a very intelligent and experienced gentleman† of Port Elizabeth, ascribes the fact *entirely to the want of a change in the nature of the crop*. It will be recollected that our marsh is composed of a body of rich blue mud, on the top of which is a vegetable resembling a sponge; and that sponge is three inches, and often more, in thickness. There cannot therefore be much substance till the surface decays and mingles with the solid sediment of tide water on which it grows. Nevertheless, every fresh or spring tide before the bank was made, left a little mud on the top of the sponge;—that little, coming twice or thrice a year, had a fertilizing effect. Additional richness was derived from the atmosphere, if we accept the opinion of a writer who asserts that “dew when purified in a vessel, has a black sediment like mud, at the bottom, which causes that darkish colour to the upper

* Sometimes called “horse shoes,”—large crawling shell fish, used for hog-feed, and giving a disagreeable fishy flavour to the pork.

† Joshua Brick, Esq.

part of the ground." Mr. Livingston has lately made experiments that sanction the remark. Leaving this fact to the philosophers, I adopt it for the present purpose, and how forcibly does it apply to salt marshes? Sir John Pringle, speaking of Zealand, says that "by the evaporation of the water in which various plants and insects die and rot, the atmosphere, during the latter part of summer and autumn, is filled with moisture and with putrid and insalutary vapours. A second but less obvious source of humidity, is from the water under ground; which in that country lies near the surface; and as the soil is light, the moisture easily transpires, and in summer loads the air with vapour, even where no water is visible. Another cause of the humidity and corruption of the atmosphere, is imperfect ventilation. There are no hills to direct the wind in streams upon the lower ground; hence the air is apt to stagnate." A better description of our salt marsh country could not be given; though the recent improvements have in a very great degree altered the general state of health in their neighbourhood. Professor Vince, of Cambridge, has ascertained to his satisfaction, that the Mediterranean sea evaporates one-tenth of an inch per diem in summer; so that our salt marshes have every chance of a great supply of fog from the Atlantic, and dew from the land; and perhaps one proof of it is, that cattle left on salt water beaches *do not require so much drink as those fed on upland*. It is said that they are supplied with the necessary moisture from descending vapour. I return from this digression to state an opinion, that the mud casually deposited by exuberant tides, with the residuum of fog and dew, may so fertilize the spongy *surface* of salt marsh, as to make it produce

heavy crops, for a few years, without imparting more durable fecundity. This *surface* being exhausted by tillage, must be enriched by manure, or by deep ploughing, or by natural causes, which will gradually embody the vegetable surface with the mud beneath;—and thus I account for the deterioration of our crop, and the means of recruiting the soil.

At this period of husbandry in salt meadows, various manures, and particularly lime, would be useful; the mud from ditches, sand from the fast land or beach, dung, and almost every manure would accelerate decay, and compress and strengthen such soil as had not a sufficient portion of mud. The marsh improved by Mr. Brinton and myself, has, in every part, a solid substratum of blue mud; and the whole body having become sufficiently compact, for horses and oxen to walk in a plough furrow, the rich soil from below is to be turned up; for where that has been done, and time allowed for the salt and sour nature to pass away, the crops are equal to any that I have heard of, and superior to most. They are not, however, so certain as in upland. The great body of our meadow was harrowed; and that is sufficient, nay better than ploughing, in the first years after the enclosure is made; but some lots were ploughed for the sake of experiment, and though they did not yield at first, as those did which were merely harrowed, we now begin to see the advantage of the operation, in giving firmness to the soil. But we should have been better recompensed (the benefit of the experiment apart) had we depended on the harrow alone for the first five years, during which the crops were good; and it would have been soon enough to plough, when

these began to fail. After the ground is once mixed by the plough and harrow, the latter implement alone is preferred for several years. One objection to ploughing salt marsh in the first five years after it is enclosed, or before the sod becomes rotten, is that the top, being turned with the grass roots up, dries in the sun; and, not having *enough moisture* to accelerate putrefaction, lies for years in the same state, like a sponge; for it is then too tough for the harrow, and clogs under it without being broken: but if it were left fast to the ground, without ploughing, a light harrow, of common construction, would skip and tear out a little at a time, in like manner as oakum may be picked, when it cannot be pulled to pieces. Another objection is, that the sod, so hard and dry when ploughed up and exposed, covers that on which it is turned; and therefore the latter has not *enough sun* to excite speedy fermentation, while it is kept sufficiently moist to cherish many of the salt grass roots: one hard sod is turned on another by the plough, and must be left so, for the slow process of time. The harrow will not break, nor tear it after it is ploughed, as in upland. Nature does more for *this soil* in the first few years after it is drained, than all the force and art of man. By letting it remain in its natural position, by waiting till it settles, as it will when the water is drawn off by ditches, all the expense of premature experiments in farming may be saved:—a due proportion of heat from above, and moisture from below, acting on vegetable and mineral soils so intimately united, will sooner effect the necessary decomposition of both; when they will form a new soil, capable of the usual improvement. Among the numerous objections to the plough in the *first few years*, I will

only add, that the tough dry sod would lie on the ground, to catch the seed it could not nourish—to trip the workmen—to arrest the sway of the sithe—to harbour moles, meadow mice, snakes, worms and insects. Beside all this, ploughing is a most difficult operation, in new marsh, when every step in the furrow brings oxen to the dew-lap.

All our exertions were attended with cost far beyond calculation; but they confirmed our original views of the value of salt marsh, where it is (as is our own) of sufficient height above the neighbouring water, and of sufficient depth of solid mud, after allowing for its settling. We were so convinced, that, as I stated before, we enclosed an additional tract of four thousand acres. We now prescribe rules for ourselves, by which we feel assured that the new marsh will not cost, at the end of five or six years, more than a third of the expense of the other.

The first rule is to avoid farming altogether for two years, by which time cattle can draw a harrow over the ground, if this has been well drained.

2d. To have nothing done on our own account, by the day, month or year.

3d. To let the meadow to the shares, or for money—preferring the latter.

4th. To authorize no repairs to the houses or out-buildings, after they are once put in order.

5th. To build barracks on the meadow, instead of barns on the upland.

6th. If the rent be payable in grain, to remove our share before the *rats* consume more than one-tenth of it.

We prefer, however, having grass seed sown thick, immediately on the bank being finished, and afterwards at proper seasons of the year;—then to put on as many cattle as we can obtain, even for the most trifling compensation—our object being to turn the whole into grazing ground.

The foregoing view of the subject is taken upon a scale of several hundred or thousand acres; and, in closing these general remarks, I beg leave to repeat, that the elevation of the marsh, the rise and fall of tides, and the quality of the alluvion, are *the most important* inquiries to be made, before a great work is commenced. I feel more zeal to make an impression on these points, having lately heard of a project for enclosing a large body, where the rise and fall of tide are but two feet. In this case I lament to say, the marsh will never bear grain or fresh grass, though the salt grass will be improved by ditches: and that in three years the meadow will be, as before the bank was made, regulated by the tide.

I now take leave to offer some opinions on the management of a *small* piece of salt marsh, after it is enclosed and well drained; because this will fix our attention to the mode of culture, without carrying us into the region of consequences attending a large body together.

Let it be supposed that ten acres of salt marsh, completely enclosed and drained, are to be put down in grain as soon as possible. Also, that ten other acres of such marsh are to be put into grass without delay. With respect to that destined for grain, I would recommend that it should be left to settle, for the first year; when a great crop of salt grass or sedge may be gathered; for in the

first year after a bank is finished, before the meadow is thoroughly drained to the ditches, the native grasses grow very high;—they afterwards diminish till they die out entirely. In the second spring, the meadow will be, according to its tenacity, covered with fresh weeds, more or less, such as butter weeds, lamb quarters, marsh elder, and a variety of plants, affording for a short time excellent pasture, especially for sheep. They grow spontaneously, as at the beginning of the world; when, according to Ovid,

“The teeming earth, yet guiltless of the plough,

“And unprovok’d did fruitful stores allow.”

Dryden’s Trans. 1 B. Metam.

The fact so remarkable, is difficult to be accounted for in this *new creation*, just raised above the waters, and often two miles distant from fast land. I have supposed that the seeds were floated and deposited with the mud, at the formation of the marsh; and that they remained inert till the sun brought them to life—his rays having been obstructed by the water, before the bank excluded it. Or, the weeds may have been produced from an invisible germ, soon after the mud became exposed to the sun. This opinion may receive some confirmation from the first chapter of Genesis.—“And the earth brought forth grass, and herb yielding seed after his kind, and the tree yielding fruit, *whose seed was in itself*, after his kind.” Those weeds, together with the remaining salt and sedge grass, should be burnt previous to sowing with grain; and a time should be waited for, when, after a rain, the moisture is not so great as to prevent the flames from spreading through the herbage, and yet suf-

ficient to keep the fire from burning the sod below the surface: if the sod be burnt, the fire frequently penetrates as low as a foot, destroying the vegetative faculty of the soil. The light ashes imparts no vigour, nor is it capable of producing a single plant of itself. Burning injures the marsh, inasmuch as its height is thereby destroyed; for the winds sport with *such* ashes even more than with snow. I have seen a Maurice river man sowing broad cast in a fresh breeze, when the sky appeared almost as black as night, with ashes; and he, in the local fashion, with his shirt-tail outside of his trousers, resembled the picture of Darwin's Demon,—“wrapt in clouds, in tempest tost.” If care be not had therefore, to the time of burning the weeds, it were better to mow them. This preparation over, oats in the spring, or wheat and rye in the fall, may be sown, selecting the solid ground only for wheat. The harrow should be passed often. The plough should not be used for several years, as before recommended. The same process may be followed (except the burning of stubble, which is not now necessary) every year, till the ground is fit for ploughing; when it may be farmed in the usual way, or put down in grass. Early sowing, before it becomes very husky, is best for spring crops—late sowing, after grasshoppers have gone, is best for fall crops, in salt meadow. Indian corn *well planted*, (not too deep nor too shallow) succeeds; flax grows high; mustard seed flourishes; and, as the soil becomes more mellow, potatoes thrive, and turnips, broad cast, do very well. The ground, in fact, is fit for any thing, and may receive the ordinary treatment; and it is so strong, as not to require manure for many years after one ploughing.

With respect to the lot destined for grass, I would respectfully recommend, that, as soon as the bank and ditches are finished, the salt grass or weeds should be burnt, when the ground is wet and the weeds dry; and that herd or timothy or clover seed should be sown—preferring herd, in low wet places, on account of its hardy nature; and timothy and clover, where the ground is dry, on account of their quality. Fire should not be used afterwards, lest the fresh grass be destroyed; but the lot should be overstocked, that all the herbage may be eaten *down* nearly at the same time. If a sufficient number of cattle be not obtained, a small number will select the fresh, and let the salt grass and weeds go, to seed,—thus enabling the latter to keep the ascendancy. In such a case, the whole should be mown even; and then as many cattle as can be had should be turned to graze on the *after-math*. They will, at the same time, trample through the crust of salt grass roots, and set the fresh grass seed fairly in the ground, if more seed be necessary. Every year will increase the fresh grass, by this process; but, as much of the seed perishes, on a salt or sedge grass surface, that does not fall into the harrow cuts or cattle tracks, repeated sowing is necessary. Three or four years will *thus* make first rate meadow.

If the meadow be low and spungy, it *never* should be ploughed, nor destined for grain: its height is better preserved by leaving it undisturbed. There are many pieces of marsh, even though the main body of the tract is better, that are high enough for grazing, and yet would settle too much by cultivation. Here the idea of irrigation occurs. The practice of overflowing fresh meadows,

to raise them, is universally approved; but salt water meadows should not be subjected to it, if it can be avoided, lest the salt water herbage revive: and here again we see the necessity of attending to our cardinal point, that of *elevation*, before a single *spit* of mud be thrown.

The marshes near Savannah have been lately enclosed. Those opposite to Charleston, (S. C.) I am told, have the necessary qualities. The western and eastern shores of Delaware bay, and the small rivers that ebb into it, afford extensive and valuable tracts, among many of no value whatever: and between Newark and New York, the best improvement in this country, all things considered, has been effected. This marsh, it is believed, is of the requisite height, and the banks are large and well constructed in every respect. A morass of three thousand acres, which separated and sickened very populous districts, has recently been brought to an healthy and fruitful state. The complete melioration of this tract remains to be seen. It will be proven to be the most valuable one, of the same dimensions, in the United States: its local situation and quality ensure this result. The worthy proprietors of it will be soon compensated for their anxiety, labour, and expense, as well as for the discouragements that constantly assailed them, from the good and ill nature of friends and pretended friends, at every step.

I regret the prolixity of these remarks; but the subject is so important, if it be touched at all, that less information should not be given; and indeed many details have been omitted, for the sake of brevity. The object is to excite undertakings that may be profitable and durable; and to discourage others. Those immense tracts

of salt marsh, forming a fringe to our Atlantic border, are, for the most part, worthless,—nay, worse; but if an inhabitant of the interior should visit them, after seeing the great improvements in other places, he may at once conceive the ruinous plan of giving to Ceres all those pleasure grounds of Neptune. On the other hand, if he cautiously consider the strength and height of the wave, with the compactness and elevation of the terraqueous shore; if, doubting, he retreat to the bay, and thence to the river, calmly to make observations, he will find *here* an ample area for his enterprise and industry: he may create the fortune of himself and descendants;—not from the sand and drift weed of the ocean, but the solid blue mud washed from the richest parts of our hills.

I am, very respectfully, &c. &c.

JOHN R. COATES.

HON. RICHARD PETERS.

Philadelphia, 4th Mo. 16th, 1818.

Esteemed Friend,

Thy address of the 11th instant was duly received, in which thou states, that the attention which I have given to the cultivation of the *Mangel Wurtzel*, will no doubt enable me to furnish a circumstantial account of the process suitable to be adopted, for the successful management of that valuable vegetable, and shall feel much obliged by my communicating the experience I have acquired on this subject. In conformity with thy request, I will with pleasure communicate any information I am in possession of on the subject; and although my experience is, no doubt, much more limited than that of many others, in respect to the culture of this highly valuable plant, yet having had, for two seasons past, considerable success in its cultivation, upon a pretty extensive scale, I subjoin the following particulars, which I am in the practice of pursuing in its culture, as well as the manner of gathering in a crop, and preserving it in the winter season. With sentiments of much respect,

Thine truly.

ISAAC C. JONES.

ROBERTS VAUX.

*Culture of the Mangel Wurtzel, or improved Beet root,
as practised by myself with considerable success.*

Make choice of a piece of ground as free from weeds as practicable, and in good tilth: if a potato crop had

been taken off the preceding season, it will be an advantage; particularly so, if the ground had been well manured, being thereby left in a mellow state. From the 6th to the 10th of the fourth month, (April,) give your ground a good ploughing, say from eight to ten inches deep, if the soil will admit of it, after which a complete harrowing, in order to level it well and break the clods. This being done, strike out furrows with the plough, two feet three or four inches apart, and double ploughed, that is, the plough returning on the same furrow, to the end whence it set out. This operation will form a trench, in which well rotted manure should be deposited, at the rate of twenty to twenty-five two horse cart loads to the acre. Muck, or manure in an unrotten state, should be avoided, as land in good heart will do better without any, than manure of this description.

After the manure is thus deposited in the trenches, the ground, previously turned from them by the plough, should be returned, also with the plough, forming ridges immediately over the manure. The tops of these ridges, being narrow and too elevated, should be somewhat flattened or levelled, either with a rake or light roller. In the middle of the ridges, the seeds are planted, so that the plants may receive all the benefit of the manure below. The seeds are deposited about half an inch in depth, (if done whilst the moisture is fresh in the ground the better,) and about twelve inches apart.

To effect this with regularity and expedition, I have formed a wooden instrument, with six teeth, in sets of two each, (see a representation annexed.) With this instrument, on the top of the ridges, as nearly over the ma-

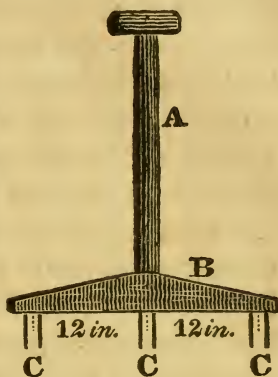
nure as practicable, indents, or small holes are formed, say half an inch deep, as above stated, into which the seeds are deposited, (one seed in each indent is sufficient provided the seeds are perfect,) and covered with dirt by the fingers. As from two to three plants generally spring up from one seed, and not more than one ought to be allowed to grow in a place, there are pretty uniformly extra plants, sufficiently numerous to insure a full crop, by transplanting, in order to fill up vacancies which may have occurred, in consequence of the failure of any of the seed. The transplanting ought to be commenced when the plants have attained the size of a quarter to half an inch in diameter, and when the ground is in quite a moist state. These precautions being taken, there are very few plants that will not thrive and do well. In transplanting, care will be requisite to form holes sufficiently deep for the plants, to prevent the point of the root from turning upwards. The mode I have adopted for dressing or keeping the plants free from weeds, and the ground in a loose mellow state, is by means of the plough and hoe :—the space between the rows being sufficiently great for the admission of a small plough, with one horse. It has been found best, in the first place, to plough *from* the plants, (taking care not to go so near as to injure them,) as it much facilitates the use of the hoe, immediately about and between the plants. After the hoeing is done, they are again ploughed, but the ground turned *towards* the plants, when the dressing is completed.

Explanation of the wooden instrument, used in forming the indents in which the seeds are planted.

A. The handle inserted into the head, or cross piece, B.

B. The head, or cross piece.

C C C. Six teeth, in sets of two each, inserted into the under part of the cross piece B. The teeth forming the different sets are about two inches apart, and the distance from the centre of one set to the centre of another, is twelve inches. It is considered better to have six teeth in sets, than to have but three teeth, placed singly: as the indents, in which the seeds are planted, being twice as numerous, doubly insure the growth of the plants; and in case of their being too numerous, can readily be pulled up for transplanting, and for the table, or given to cattle or hogs.



Time and manner of gathering in a crop of Mangel Wurtzel, and preserving them in the winter season.

1st. As to the time.—A good deal will depend upon the state of the season, but as a general rule, I think it may with propriety be stated from the 1st to the 10th of the eleventh month, (November.)

2nd. The manner I have pursued is, when the weather is dry and favourable, to pull up the plants, with the leaves; then break off the latter as near the plant as practicable, (except those roots you wish to preserve for seed the ensuing season; the leaves of these it will be best carefully to cut off, from two to three inches above the

crown of the plant,) after which, shake off as much of the dirt as you conveniently can, and lay the plants upon the top of the ridge they were pulled from, in order that the residue of the dirt adhering to them may dry ; in which state it may readily be rubbed off by the hand, or a stick of some soft wood, made smooth, to prevent bruising. After they are thus cleared, and in a dry state, they are ready for housing, in any dry place, secured from the frost. I have also had them keep remarkably well, through a very severe winter, in a garden or field, covered with earth, in the form of a conical mound or heap. In preserving them in this way, it will be requisite to select a piece of dry ground, on which to form your heap, around which make a trench sufficiently capacious to afford a quantity of earth to cover them one foot, or fifteen inches in depth. At the time of so covering them, the ground thrown over, should be made very compact, which may be done by treading it, for if loosely thrown on, wet will be more likely to penetrate, and of course injure the roots.

ISAAC C. JONES.

P. S. If thought most advisable, for expedition, the head of the instrument for forming indents may be extended, so as to take in four or more sets of teeth, instead of three, as represented.

On burning Clay for Manure. By James Mease, M. D.

The history of agriculture shows that the influence of fashion extends as well to the cultivation of the earth, as to dress, or to any of the common occurrences of life. This remark applies strictly to the subject of using burnt clay for manure, of the utility of which we have heard so much within two or three years past. This practice, it appears, is quite ancient in Europe, and has been pursued with zeal at one time, and at other times fallen into neglect. It is mentioned in "The Country Gentleman's Companion,"* and there stated to have been introduced by the earl of Halifax, in the county of Sussex, in England. The burnt clay is said to have been found particularly beneficial to turnips, an excellent crop of which would follow, even in worn-out land, if only ploughed two or three times and the clay ashes spread over it.

The utility of burning clay for manure is also mentioned in the "Outlines of the 15th chapter of the proposed general Report from the Board of Agriculture," (of England,) on the subject of manures, drawn up by the late Robert Somerville, of Haddington,† p. 87. It is there stated, that they are very beneficial "in cases where the soil is very stiff, and strongly retentive of moisture. A mixture of burnt clay upon such soils will not only break their cohesion, and make them more easily cultivated, but will also render them less retentive of moisture." Mr. White Parsons, at West Cawel, states, "that he finds lime, after

* By Stephen Switzer, Lond. 1732.

† London, 1795.

the use of clay ashes, a very powerful manure upon such lands, though it had formerly been tried, in three times the quantity, without doing the smallest service." But upon thin clays any attempt at burning would be highly improper: such lands contain too little of the principles necessary to vegetation. The practice, it appears, is extensively adopted in Ireland; and in the "*Caledonian Mercury*," (Edinb. July 15, 1815,) there is a letter from Alexander Craig, of Cally, dated January 28, 1815, to Edward Boyd, esquire, of Merton Hall, giving an account of its utility, and of the mode of conducting the process. The following is an extract from the letter.

"Being perfectly convinced, both from ocular demonstration and personal experience, of the infinite utility of clay ashes, as a manure for every kind of crop, as well as a top dressing, I am extremely anxious that the use of them should become universal. I shall, therefore, have much pleasure in communicating to you every information on the subject, and I have now sat down to accomplish that object, as far as lies in my power. Having had occasion, for some years past, to go repeatedly to Ireland, on the business of Mr. Murray's estate there, I was struck with the method adopted in some parts of that country of burning clay, and making use of the ashes in preference to lime, of which there is such abundance. The method also adopted of causing the clay, just as it is dug out of the ground, and without preparation of any sort, to burn of itself, without the assistance of any combustible, arrested my attention; and having witnessed the crops of wheat and corn of every description, as well as flax and potatoes, luxuriant almost beyond credibility, produced from stiff clay soils, without the aid of any other manure

than ashes so obtained, I determined to make the experiment at home ; and accordingly, on my return, I commenced operations, and have practised the burning of subsoil for three years, with the greatest success. I was diffculted at first for want of clay, but I hit upon a vein or bed of tenacious subsoil, partly till, and partly clay, which answers the purpose quite well, though I do not apprehend it is so good as clay. The ashes I have hitherto applied solely to the production of turnip, but within the last ten days I have laid nearly five hundred cart loads on grass lands, as a top dressing ;—my turnip crops from ashes have exceeded any thing of the kind in this neighbourhood. I was twice in London, in the course of last summer and harvest, and on my way to and from town, I saw no turnips superior, hardly any equal to my crop, though I passed through Berwickshire and Northumberland.

“ Last season, by way of experiment, I manured part of my turnip field with well rotted stable dung, which was ploughed in the same day it was led out,—the remainder with ashes ;—the seed, which was the yellow-field sort, was sown on the same day ; that sown on the ashes sprung much earlier than that on the dung, continued more vigorous during the season, and when I pulled them lately, the turnips produced from the ashes were more than double the size of those from the dung. Excepting myself, no person has hitherto practised the burning of clay or subsoil in this country, till last season, when I prevailed on Mr. John Wallace, a tenant of Mr. Murray’s, in Tongland parish, to try the experiment. Though it was about the beginning of May before the burning commenced, yet Mr. Wallace obtained as many ashes as ma-

nured twenty acres. Notwithstanding the turnips were later of being sown than usual, and were too long in being hoed, Mr. Wallace obtained for them the second premium for green crop from the Agricultural Society in the Stewartry, and since, the Highland Society have awarded to him their first premium.

“ Mr. Wallace has a considerable quantity of ashes on hand for his Swedish turnip this season, and he means to have at least sixty acres of turnip from ashes. So fully convinced is he of the superior efficacy of clay ashes, that he has repeatedly declared to me he would not now be at the trouble of carting dung from Kirkcudbright to his farm, though only one mile and a half distant, even if he were to get the dung in a present.

“ Though I do not apprehend that any written account I can give you, will afford half so satisfactory an idea of the method of burning clay, or indeed any kind of subsoil of moderate tenacity, as ocular inspection of the work, yet I shall give you the best description I can.

“ The general method of proceeding to work, is to make an oblong inclosure, of the dimensions of a small house, (say fifteen feet by ten) of green turf sods, raised to the height of three and a half or four feet. In the inside of this inclosure air pipes are drawn diagonally, which communicate with holes left at each corner of the exterior wall. These pipes are formed of sods put on edge, and the space between them so wide only as another sod can easily cover. In each of the four spaces left between the air pipes and the outer wall, a fire is kindled with wood and dry turf, and then the whole of the inside of the inclosure, or kiln, filled with dry turf, which is very soon on fire, and on the top of that, when well

kindled, is thrown the clay, in small quantities at a time, and repeated as often as necessary, which must be regulated by the intensity of the burning. The air pipes are of use only at first, because, if the fire burns with tolerable keenness, the sods forming the pipes will soon be reduced to ashes. The pipe on the weather side of the kiln only is left open, the mouths of the other three being stopped up, and not opened, except the wind should veer about. As the inside of the inclosure, or kiln, begins to be filled up with clay, the outer wall must be raised in height, always taking care to have it at least eighteen inches higher than the top of the clay, for the purpose of keeping the wind from acting on the fire. When the fire burns through the outer wall, which it often does, and particularly when the top is overloaded with clay, the breach must be stopped up immediately, which can only be effectually done by building another sod wall from the foundation, opposite to it, and the sods that formed that part of the first wall are soon reduced to ashes. The wall can be raised as high as may be convenient to throw on the clay, and the kiln may be increased to any size, by forming a new wall when the previous one is burnt through. I have had them so wide as to afford space for a horse and cart to turn on them; but, when they are so broad, it requires the workmen to walk on the top of them when feeding with clay, which I would not recommend, because, the more loosely the clay can be laid on, the more rapidly it will burn. I did not take all the trouble above stated with my kilns—having the advantage of a quantity of old moss sticks and tree roots, which I split, and kindled a large parcel of them, and surrounded the fire with a quantity of dry turf,

and, as soon as it was well kindled, I built round a strong wall of sods, and went on, adding clay to the fire, and sods to the outer walls when necessary, till the kilns were so large as to contain upwards of one hundred loads of ashes.

“The principal secret in burning consists in having the outer wall made quite close and impervious to the external air, and taking care to have the top always lightly, but completely covered with clay, because if the external air should come in contact with the fire, either on the top of the kiln, or by means of its bursting through the sides, the fire will be very soon extinguished. In short, the kilns require to be attended nearly as closely as charcoal pits. Clay is much easier burnt than moss or loam,—it does not undergo any alteration in its shape, and on that account allows the fire and smoke to get up easily between the lumps,—whereas moss and loam, by crumbling down, are very apt to smother the fire, unless carefully attended to. No rule can be laid down for regulating the size of the lumps of clay thrown on the kiln, as that must depend on the state of the fire, but I have found every lump completely burnt on opening the kiln, and some of them were thrown on larger than my head. Clay no doubt burns more readily if it be dug up and dried for a day or two before it be thrown on the kiln, but this operation is not necessary, as it will burn though thrown on quite wet. After a kiln is fairly set a-going, no coal or wood, or any sort of combustible, is necessary, the wet clay burning of itself, and it can only be extinguished by intention, or the carelessness of the operator, the vicissitudes of the weather having hardly any effect on the fires, if properly attended to. It may perhaps be ne-

cessary to mention, that when the kiln is burning with great keenness, a stranger to the operation may be apt to think that the fire is extinguished ; if therefore any person, either through impatience or too great curiosity, should insist on looking into the interior of the kiln, he will certainly retard, and may possibly extinguish, the fire. For, as I mentioned before, the chief secret consists in keeping out the external air from the fire."

The person communicating the letter signs himself "E. D." and says that "several farmers leave out altogether the air pipes and holes, or tubes, and only make plain walls of green sods. The size of the kiln is fifteen by twenty-five feet, and some are even larger, when the weather is fine and dry. It is only in dry weather that the clay can be burnt to advantage ; for if it is wet, the process is slow ; and unless there is a tolerable quantity of vegetable matter in the clay, it will be liable to burn into hard pieces, like brick ; but a good stiff subsoil, or a clay that has vegetable matter in it, will answer exceedingly well."

The foregoing letter is also published in the "Farmers' Magazine," of Edinburgh, for May, 1815, by Edward Boyd, of Merton Hall, who says, that he has "seen wonderful effects, for years, from ashes upon his own estate," and congratulates the farmers of Galloway upon their being enabled to supply the Glasgow market with fat mutton (when it cannot be got elsewhere) by the use of turnips raised by ashes.

In a subsequent letter from Mr. Craig, inserted in the Edinburgh Farmer's Magazine, for May, 1815, p. 143, he says, "On the 28th instant, (February, 1815,) I pulled and weighed a square chain of the Swedish turnips ;

the weight per acre amounts to 52 tons. 1 cwt. and 48 pounds. Six turnips weighed eighty-one pounds; and a single turnip weighed fifteen pounds, three ounces. I suppose the produce is superior to any thing ever known in this country, on the best soils; and when the quality of the ground on which these turnips grew, (a thin, light soil, on a rocky bottom,) is taken into consideration, the produce is almost incredible. My Swedish turnips, from clay ashes, the year before, were fully better than the above crop, owing to the seed having been remarkably good. The above weight includes the tops and tails of the turnips; but as they grew in the centre of Mr. Murray's preserve of game, very little of the tops remained, the whole having been stripped off by the pheasants, and a part of the turnip also having been eaten by hares."

In the number of the foregoing work for November, 1810, Major-general Sir H. M. Vavasour, of Milbourn Hall, Yorkshire, gives his testimony in favour of the utility of clay ashes as manure for wheat. He says, "I last year manured forty acres for wheat, at the rate of twenty cubical yards per acre: the effect was equal to my hopes: half of the field was manured with dung, about fifteen tons per acre; the other half with clay ashes, twenty solid yards, about twenty-five tons. Several farmers, who viewed the crop, thought the part covered with ashes the best. After being cut, that part appeared decidedly the best crop. Two lands in a field were manured with a double portion of ashes, and there the corn was laid: a strong proof of their effect."

From the foregoing testimony in favour of burnt clay, no doubt can remain as to its fertilizing properties, and as there are extensive clay districts in most of the old

settled states, I have no doubt the experiment will be made, of applying the ashes as manure.

The following mode of burning clay with cord wood, was published by Mr. James Riley, of Elizabethtown, New Jersey, last autumn ; who says, that Mr. Merriott, near Hudson, New York, has proved the great utility of the ashes as a manure.

“ On a spot of clay ground, take half a cord of good dry wood, cut it of different lengths, from two to four feet, and pile it up in the manner of setting wood in a coal pit, with kindlers in the centre, then dig or cut up the sods around it, and cover over the pile of wood one thickness : next make a channel from the centre of the wood to the outward edge of the circle intended to be occupied by the body of clay. This channel must be formed of sods or turf, and a foot in height by a foot in breadth, in form of an arch—it is for the purpose of setting fire to the pile, and keeping up a current of air to the centre.

Thus prepared, dig up the clay round about, and throw it on the pile, covering the whole with an equal thickness, two, four, six, eight, ten, or more feet, and set the wood on fire, keeping the channel open to admit air ; the mass becomes heated in a short time, and the whole body of clay burns until it decomposes and is reduced to ashes ; the longer it burns, the greater the heat, and the quantity may be increased at pleasure, without any additional fuel. Care must be taken night and day, that the fire does not break forth, and some sods or clay should be kept constantly ready to prevent the heat from escaping, until a sufficient quantity is obtained. As long as it is fed it will never cease burning. When enough is burned, let it alone, and the fire will break out and soon extinguish.

When cool, the ashes thus produced are fit for use, and may be put on clay land in the same manner as wood ashes, and will have an astonishing effect in producing prodigious crops of either grass, grain, or any vegetable."

In the 14th volume of the Bath Soc. Memoirs, the Rev. W. Wilkieson also gives an account of his experiments on burning clay. The soil was a cold, stiff, tenacious clay, that had been over cropped for a series of years. He marked out a space of fifteen by twelve feet, excavated it one foot deep, and with the soil thrown out made a wall round the space. At each corner he made an air pipe, each pipe (made of sods) extending only two feet into the enclosure, in a diagonal direction. In the centre of the enclosure, he placed upright the but end of a large tree, around which other fuel was placed, covering the bottom of the whole space within the wall. Dry turf was placed over the whole surface, which was again covered with a thin coat of clay, except a small hole by which the fire was introduced. The fire spread rapidly, and it required the exertions of two men to smother the flames as they burst out. During the first two or three days, the surface of the heap occasionally sunk in places, and apparently grew cold; into these places fresh fuel was put, care being taken to make small openings, and that the operation be done as speedily as possible; for external air let into the heaps, seems to do mischief. Each covering of clay crumbled to ashes in an hour or two after it was put on. The heap was on fire twelve days, and was attended by two men: one was chiefly employed in digging the clay; the other in wheeling it to the heap and throwing it on, sometimes by hand, and sometimes with a spade. The ashes were tried as a

manure, first for barley, and with better effect than dung. On turnips, the effect was striking: many of them being twenty-six inches in circumference.

In another communication from a gentleman, in the *Farmer's Journal*, London, December 30, 1816, he says that the kilns should be made small by a beginner, about three yards wide and six long, in the inside; as he becomes more skilful, they may be made larger. The walls are to be made of sods, two feet thick at the bottom, and one foot at the top, leaving two flues in each side, and one in each end, about one foot square: the walls to be four feet high. As the quantity of clay is increased, during the progress of the burning, the walls should be raised, keeping them about a foot higher than the clay: about six feet will be as high as can be conveniently burnt. He applied the ashes to wheat, upon a clay soil, spreading them after the last ploughing, and harrowing them in with the seed, at the rate of thirty tons per acre. The longer the ashes remain on the land before harrowing, the better, that the lumps may fall and mix with the soil. Mr. Curwen says, "that clover lays have been top dressed with the ashes, without any apparent advantage."*

In the *Farmers Magazine* of Edinburgh, for November, 1815, the following method of burning sods and clay, by means of quicklime, without coals or any other fuel, is given in a letter from John C. Curwen, of Workington Hall, Cumberland, to George Dempster, Esquire, and as the multiplication of manures is an object of great consequence, it was thought a proper appendix to the foregoing papers. On some soils, the combination may suit better than either lime, or clay ashes separately.

* *Farmer's Journal*, December 22, 1817.

“ On burning Sods, and Clay, by means of Quicklime, without Coals or any other Fuel.

“ Workington-Hall, September 2, 1815.

“ Sir,

“ On my return from Scotland yesterday, I found your favour ; and am happy to afford you, as far as in my power, the information you require, as to the mode of burning surface soil, and clay, by lime.

“ Mounds of seven yards in length, three and a half in breadth, are kindled with seventy-two Winchester bushels of lime :—First, a layer of dry sods or parings, on which a quantity of lime is spread, mixing sods with it, then a covering of eight inches of sods, on which the other half of the lime is spread, and covered a foot thick ; the height of the mound being about a yard.

“ In twenty-four hours it will take fire. The lime should be immediately from the kiln. It is better to suffer it to ignite itself, than to effect it by the operation of water. When the fire is fairly kindled, fresh sods must be applied. I should recommend obtaining a sufficient body of ashes before any clay was put on the mounds. The fire naturally rises to the top. It takes less time, and does more work to draw down the ashes from the top, and not to suffer it to rise above six feet. The former practice of burning in kilns was more expensive ; did much less work ; and, in many instances, calcined the ashes, and rendered them of no value.

“ I have recently seen a good deal of burning in various parts of Scotland, most of which was ill done, being burnt into lumps. I question whether clay can be made into ashes advantageously, without a mixture of surface soil. It is either calcined, or not sufficiently burnt.

“The advantage derived from ashes appears to be by absorption of the atmosphere. The necessity of having them fine, (admitting the principle correct,) is indispensable for their producing the full effect.

“Some of the kilns I saw employed in burning clay, were worked with small coal. I recommend the breaking down the walls, in order to moderate the heat, as well as a means of expediting the work.

“I have just completed paring, with the skim-coulter plough, twenty-six acres of clover lea of the second crop, which I intended next year for turnips. The sods were well broken with the harrows, which freed them of the greatest part of the mould. The residue was burnt, and has afforded me above a thousand single-horse carts of ashes.

“There are twelve mounds, with seventy-two Winchester bushels each. One fire would have burnt the whole. This was not deemed expedient, as the increased cost of cartage would far have exceeded the expense of the additional lime.

“I think it may fairly be supposed, that the lime adds full its worth to the quality of the ashes. Where limestone can be had, I should advise the burning a small quantity in the mounds, which would be a great improvement to the ashes, and at the same time help to keep the fire in.

“I have manufactured for use this season, two thousand carts of ashes (single) and have raised from them fifty acres of turnips (Swedish,) with sixty carts of ashes, fully equal to what had a hundred of good dung. Twenty-one acres with thirty carts very good. I expect they will reach thirty tons per acre. Some with forty on clay,

not so promising ;—the state of the soil accounts for the difference.

“I should advise that from fifty to sixty carts be given ;—you must understand I speak always of single carts. Two acres of cole, which had forty carts of ashes, the surface soil being burnt for turnips, are an admirable crop ; and show, where there is depth of soil, the burning is unattended with injury.

“I conceive I am justified in anticipating a rapid increase of green crops, the means of producing them being now within the reach of every one.

“The farmer who consumes his straw with turnips, makes manure nearly in a ratio of eight to three, and advances the quality full one-half. By augmenting the quantity of dung given to strong soils, much benefit will accrue, as has been satisfactorily proved by the interesting experiment of Mr. Stewart of Hillside, Fifeshire.

“I do not think I am too sanguine in viewing the general adoption of the system of surface soil and clay-burning, as likely to be the most important discovery for the interests of agriculture, that has occurred since the introduction of the turnip into Norfolk by lord Townsend.

“If any further information appears to you requisite, I shall have great pleasure in hearing from you ; gratified in the opportunity of proving the respect with which I have the honour to remain,

“Your obedient servant,

“J. C. CURWEN.”

The following INQUIRIES on the subjects stated, are respectfully submitted to our Agricultural Fellow-Citizens, for the information sought, by proposing them.

I. The best mode of *preparing land for tillage crops*, and the seasons for breaking up ;—fall or spring ;—deep or shallow ;—so as to meliorate the soil, forward the business of husbandry, and destroy insects and their *larvæ*, likely to infest and ruin our crops ? Modes of destroying or banishing moles, rats, mice, and such foes to our fields and ingathered crops, demand our serious attention.

II. What *times are the best for seeding*, winter or summer grains respectively ; and the quantities of seed required per acre ; and what soils require *thick* and what *thin* seeding. The quantities of produce of different grains on designated soils, naturally fertile, or made so artificially ; and the modes of culture. The average products of farms in a neighbourhood, township, or county, either of grains or grasses, and other products commonly cultivated ; and the expenses and labour of cultivation, with the current sale prices ; and the average prices of land in a neighbourhood, township, or county ; so as to furnish materials for statistical calculation ; noting the general texture of the soil, sand, loam, clay, &c. ?

III. Discoveries of *known or new manures*, and practical information as to their effects ; modes of applying, and quantities applied. Best modes of using known manures of all kinds ? Results of experiments with salt, applied in small quantities as a manure, would be highly acceptable.

IV. The best, most economical, and salutary *modes of preparing food for domestic animals*, on dry or succulent provender; and what roots, as substitutes for grain, are most eligible?

V. The most effectual and cheapest *modes of preparing and fitting crops*, for domestic use or market; saving labour by threshing machines, or treading out by horses, &c. and average cost of such preparation or process?

VI. The most proper *systems of cropping*, suitable for different soils; the kinds of grain most profitable, and the least exhausting, in specified soils and situations? What species of grain, or other vegetable products, best succeed others, and the best modes of culture for each? What soils or situations best suit winter or summer *wheats*; and the species most preferable; as well for productiveness, as least liable to diseases; such as mildew, blight, rust, stunt or smut; and what kinds are the least injured by the *Hessian fly*? concerning which, well ascertained facts should be collected and communicated.

VII. The introduction and experienced use of *grasses*, best calculated for particular soils; and which will grow and ripen congenially together; and the most proper mode and season for sowing, and stage of growth for cutting for hay; the different kinds of grasses?

VIII. The most convenient *sizes of fields*, in proportion to farms, for *shifts and changes of crops*; and the most profitable changes; and the periods for which those most permanent in the rotation should remain; so as to promote the progressive and durable improvement of the farm?

IX. The proportion of *timber land*, and the *kinds of timber*, which ought to be reserved, and devoted to, and carefully preserved for, their uses on farms ; for building implements, fuel and fencing ; the most economical and durable modes of *enclosing fields in old settlements*, either with live or dead fences ; and what kinds of plants or materials are the best ; and of the latter, what timber affords those the most durable, either above or under ground ? Of the plants for *live fences*, what are the best kinds of *thorn*, or other plants as substitutes ; and the best modes of hedging and treating hedge-plants, from their earliest stage to maturity ?

X. The best modes of *clearing and cropping*, as well as of *enclosing new lands* ?

XI. The best *agricultural implements* ; and improvements on them ?

XII. *Irrigation*, or watering, both arable and grass grounds ; and the best modes of using water for either purpose ; and the best kind of water, and times of applying it, for grass or tillage crops ; ditching, draining, embanking and profitably clearing bogs or marshes, salt or fresh ; and the best modes of cropping and laying down permanent grasses on reclaimed marshes or bogs ; and the grasses most proper for such soils ? Artificial modes of collecting water for irrigation ; and its deposits for manure ? *Warping*, for fertilizing grounds on which it can remain stagnant, or destroying bad vegetation and otherwise unconquerable pests ? What timber is the best and most durable for pipes, exposed or covered with earth, for conveyance of water, for any purposes ? And what is the best mode of constructing and fixing such pipes ?

XIII. The most proper times *for sowing or planting useful roots and other vegetables* ; and the kinds most suitable, in garden or field culture, in our climate and circumstances ; for our consumption, as esculents ; or in the arts ; or for food of domestic animals ?

XIV. The best and cheapest *modes of extirpating weeds and pests* ; and the times or stages of growth, when they are the most easily destroyed ; including modes and times of tillage for this purpose, cutting, or other means ; and the uses to which such nuisances can be turned ? A botanical description of noxious weeds, plain and practical, would assist in the knowledge of their habits, times of seeding and growth, so as to facilitate their destruction, when they are the most capable of annoyance.

XV. *Breeds of domestic animals* ; of every kind ; the most beneficial, calculated for local situations, pastures, and other circumstances peculiar to particular sites and districts of country, wherein they are respectively bred or employed ; noting those the most proper for draft or burthen ; kept the most conveniently and economically ; and a comparative calculation of the use of *oxen*, and the best mode of gearing and working them, mules, &c. as it respects *horses*. Also the diseases to which domestic animals are respectively subject ; with suggestions of remedies and preventives ?

XVI. *Fossils*, and other natural products, *convertible into manures*, found on or near farms ; and the best modes of applying marles, lime, and other such auxiliaries. Modes of mixing soils, and proportions of each,—paring and burning the surface soil,—burning clay, peat, &c.

and using their ashes,—and every application of *fire* to soils?—will fall under this head of inquiry?

XVII. The best mode of *recovering worn lands*; within the reach of common farmers; and, of course, with the least pecuniary expenditures;—to wit:—by good husbandry, proper courses and kinds of crops; the best modes of filling gullies, and removing other impediments to cultivation; and particularly attending to the improvement of soils, by the means pointed out in the preceding inquiry?

XVIII. The best and most profitable *management of a dairy*; the breed of cows most suitable, and the most effective, nutritive, and economical food, and means of preparing it; and the modes and times of feeding and milking most beneficial, either as the dairy is applied to butter or milk; and a comparative statement of both employments of the products of the dairy, as respects the immediate saleable articles, or other purposes, to which the refuse milk may be applied. If *cheese* be the object, a relative or positive statement is requested?

XIX. *The best plan of a farm-yard*; and the most convenient and most economical *buildings and covers for stock*; the best modes of treating and increasing farm-yard or stable manure—in well constructed stercoraries, composts, and otherwise? The best *plan of a barn*; sties for swine, and all minor accommodations supplementary to the barn; and the whole management of the farm-yard, and dispositions of the various species of stock, are included in this inquiry? If *plans of farm houses*, of the most convenient and economical elevations and structure, with accommodations for stock, and calculated for every sized farm, and even for cottages, were

also furnished and promulgated for the instruction and choice of our rural fellow-citizens, they would conduce to *their* real comforts, as well as to the decorous appearance of the country. The most expensive are not always the most convenient dwellings; and houses and other buildings on the best construction, can often be erected with less cost.

XX. *Comparative results in the same or a neighbouring farm* of equal capacities, applied to tillage crops, mixed husbandry, or solely devoted to *grazing* or *dairy*; would highly benefit those who have the choice of employing their present farms in either way; or purchasing property, suitable for either mode of occupation or culture. If any such results are known, from actual experiment, what is the conclusion to be drawn from them?

XXI. Experiments in the *drill-husbandry* and *row-culture*, of wheats and other small grains, roots and other vegetable products usually thus cultivated, by those who, in circumstances to practise it, could best succeed, and inform of results? Cleansing foul grounds by horse-hoeing, and increasing crops by frequent stirring of the intervals, have raised estates in England and other European countries, particularly that of Mr. Coke, of Norfolk, to many fold their former value. If such culture has been practised here; to what extent has it been carried; and with what success? It is believed that, except with Indian corn and potatoes, very little has been done here in this mode of cultivation.

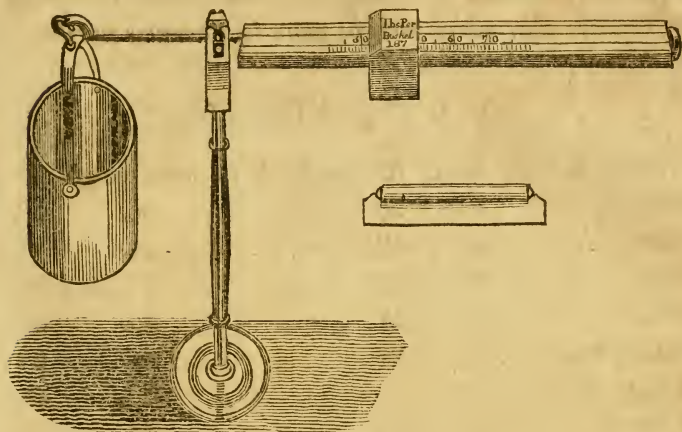
XXII. It would be well for those who incline to keep more stock, than the common mode of depasturing at large will admit, to make experiments in *soiling*, or feeding in stalls, yards, or pens, with *green forage*; which

supersedes the necessity of interior enclosures, economizes food, increases the dung heap, and can be accomplished where labour is easily obtained. If any such experiments have been made; what have been the results? And what grasses and other plants are the most profitable and salutary for stock thus fed?

XXIII. The most durable kinds of *fruit trees*, of every species adapted to our climate and circumstances. *Apples* are of the first importance: the diseases attending them, and other fruits; and the insects and vermin often fatally annoying them, should be noted and reported, with the remedies for, or preventives of, their maladies; and the means of repelling or destroying their foes? Also the best modes of treating orchards and nurseries, and propagating fruits, of every species.

Improved Pocket Chondrometer.

The *Chondrometer* being much relied on, by dealers in grain and flour, in *Europe*; it has been deemed useful to give a cut of this instrument; and directions copied from those printed and accompanying it, according to the scale used in *England*; from whence it was imported. Our workmen can readily furnish any number required of these valuable and portable articles. The specimens of weights, No. I. are those of English grains and grasses. No. II. are American average weights, according to the best information which could be obtained on a hasty inquiry. It would be well, if those better informed would furnish a more general and accurate account of weights of American grains and seeds. It is now the established custom to buy and sell *wheat* by *weight*; reckoning the bushel at sixty pounds. *Barley* is also bought and sold at the standard weight of forty-eight pounds. All grains and grass seeds should be sold and bought by some standard weight;—far preferable to measures; which are subject to great uncertainty, and no small deception. Our mills, of the best construction, make from twenty-one to twenty-three barrels, (each weighing one hundred and ninety-six pounds,) of superfine flour, from one hundred bushels of wheat of the standard weight.



*Directions for the Improved Pocket Chondrometer ; for
ascertaining the weights of all kinds of Grains, or
Farina.*

First, fill the measure, or bucket, in the same careful manner you would do, if it were a real bushel ; and, with the roll, strike off the top ; only observing, (as this instrument is upon a diminished scale, and that as the more bearded, or rougher kinds of grain, such as oats, &c. are more liable to be torn up by striking, than the smooth and free,) that they should be charged somewhat heavier, or they would lose too great a proportion, in so small a quantity, by striking ; and thereby appear too light. Secondly, hook the bucket on the end of the scale-beam, remove the brass slider to that part of the divided scale, where it will just preponderate the bucket and its contents. Then look at the fiducial edge of the brass slider ; and observe at which degree it stands ; that being the weight of an eight gallon bushel of the grain upon trial.

Nine specimens of the weight of marketable Grain per bushel: that which weighs more is, (cæteris paribus,) better; and vice versa.

No. I. *English Grain, &c.*

	lbs.	lbs.			lbs.
Wheat is from	55	to 63	per bushel; mean weight		59
Rye -	50	56	- -	do.	53
Barley -	45	49	- -	do.	47
Oats	35	43	- -	do.	38 $\frac{1}{2}$
Peas	62	67	- -	do.	64 $\frac{1}{2}$
Small Beans	60	66	- -	do.	63
Dutch Clover	65	71	- -	do.	68
Canary	54	56	- -	do.	55
Rape	47	50	- -	do.	48 $\frac{1}{2}$

N. B. If, instead of the roll, you make use of the flat strike; the grain will appear to be from one to two pounds per bushel lighter.*

No. II. *American Grain, &c.*

Wheat, State of New York,	59	} Mean wt.	lbs.
Pennsylvania,	61		59 $\frac{1}{4}$
States south of Penn.	57 $\frac{1}{2}$		
Rye, - - - - -	-	do.	57
Barley, - - - - -	-	do.	48
Oats, - - - - -	-	do.	35
Indian Corn, (up country,) - - -	-	do.	58
ditto. (sea board,) - - -	-	do.	54
Speltz,—Query?			

* There is so much uncertainty in the measurement of grain, (as I have been informed by candid and experienced dealers,) either unskilfully or negligently; or intentionally, to serve purposes: that 7 $\frac{1}{2}$ to 10 per cent, may be gained or lost. R. P.

Buckwheat,—Query?		lbs.	
Red Clover Seed, 64 to 67 lbs.	Mean wt.	65 $\frac{1}{2}$	
Peas, - - - - -	do.	63	
Timothy Seed,—Query?			
Orchard Grass, (<i>Dactylis glomerata</i> ,)			
from 13 to 18 lbs.	do.	15 $\frac{1}{2}$	

There is much fallacy in the sale of this seed ; a great proportion of chaff being mixed with it, to increase the bulk. It should be sold by weight.

The preceding weights of grain were obtained from intelligent dealers and millers, at *Brandywine* ; one of the most extensive marts for grain and flour.

The grass seeds are deemed right ; but must be subject to future correction. The oats are high, as an average ; thirty-one or thirty-two pounds would be nearer the general average weight. The average of clover seed is by some estimated at sixty-three pounds. Wheat has weighed as high as sixty-seven and a half pounds, and corn (Indian) sixty-four pounds per bushel. Some barley, fifty-two to fifty-four pounds ; much depends on season, and the kind of corn, or grain ; as well as on soil and culture. It is said, that barley under forty-five, will not malt profitably ; nor will wheat under fifty-six, make good superfine flour.

Several other statements of weights were obligingly furnished ; but the press could not be delayed for their insertion. Our correspondents, in various quarters of our country, would render an important service, by enabling us to publish a correct statement of the weights of grains and grasses in their respective neighbourhoods ; or at places of extensive sales, or manufacture.

R. PETERS.

NOTE.

A highly respectable friend has been so good as to point out to me my careless mode of expression, in my "*Notices for a young Farmer*," page xxxvi. I mention *wheat* being so injured by stagnant water, "as to become abortive; and produce only *cheat*." I should have said, "*and the spot on which it had been sowed, produced only cheat*." I do not believe in the transmutation of grain from one kind to another; more than I credit the transmutation of metals. Crossings and hybridous *mixtures* are to be accounted for; but *they* proceed from intercourse of perfect plants. *Cheat* often succeeds, or rather takes the place of, destroyed or abortive wheat: why?—I do not pretend to assign the cause. I have known *cheat* sown, produce *cheat*: but never change its kind on frequent repetitions. Plants degenerate by bad, and meliorate by good, culture; but do not change their kind. *Wheat* is, originally, a mean *gramen*; yet it is *wheat*, and not *cheat*. I have never seen any scientific or botanical description of *cheat*, so as to induce me to believe it a degenerated *wheat*; or any variety of the *triticum*. Botanists must determine this question.

He informs me, that the *Lawler* wheat, (*Jones's*,) is pipy, or hollow and soft strawed; and yet it is not injured by the Hessian fly. If this be generally the case, it is a fortunate discovery. All my knowledge of it, is contained in a note, page 218. Whether it *resists*, or is *avoided* by, the fly, I know not. I have found that solid strawed or cone wheats, *resist* injuries by the fly; and other wheats, with good farming and late seeding, are successful generally; but not uniformly. Some kinds of wheat escape the *stunt*; which is believed by many to occur from injuries by insects. I have supposed, that some species of the same genus of plants are disgusting to insects; and thus escape their ravages. See a note on the subject, page 26. It seems the Blue straw wheat is a victim to the flies, though the straw is coarse and strong; and the *Lawler* escapes their assaults. Whether they have predilections for one more than the other, is worthy of inquiry. I have thrown out opinions on the subject of some plants being favourites with particular insects, whilst they have antipathies to others. I hazard these opinions to invite information.

R. PETERS.

August 23, 1818.

Weight and size of a beautiful Ox, sold in the Philadelphia Market in 1818.

Philadelphia, August 26, 1818.

Dear Sir,

Agreeably to your request, on behalf of the society, I have collected all the facts I could obtain in relation to the ox; the drawing whereof, said to be a correct likeness, was exhibited at one of the meetings of the society. I have also procured a cut of that very fine animal; those from whom I obtained information have not been so minute and satisfactory, on some points, as I could have wished; but what is communicated may be depended on.

He is of the Bakewell breed; from what stock originally crossed is not known. He was seven years old when killed, and ran two years on salt marsh; after four years old he was put in the stalls, and fed on Indian meal and clover hay during winter. In the summer season he was turned out to grass, and also fed on Indian meal; precedently to the three last winters, during which he was fed with sifted Indian meal and some wheat flour: what quantities of either were given at a mess, or in amount in the whole, cannot be ascertained. He was raised and fed by Job Tyler, of Salem, West New Jersey.

WEIGHT.

Weight when alive,	- - -	2723 pounds.
Weight of Beef,	- - -	2165 do.
Weight of rough fat,	- - -	136 do.
Weight of the hide,	- - -	125 do.

DIMENSIONS.

Length along the back,	- - -	9 feet 0 inches.
Height	- - -	5 2 1-2
Thickness through the chuck,	2	9 5-8
Thickness through the body,	3	2 1-2
Thickness through the hips,	2	9 5-8
Girth round the brisket,	- 10	3 5-8
Girth back of the fore legs,	9	7 1-4
Girth of the body	- - 10	2 1-2
Girth of the hips,	- - 10	0
Girth of the length of the body,	17	8 1-2

I remain, with sentiments of respect, your friend,

RICHARD WISTAR, JUN.

HON. RICHARD PETERS.



SALEM OX.

INDEX.

 Some notes are inserted, which circumstances prevented being introduced in their proper places.

A

- Adlum, John; his letter on the season of 1816, fall
ploughing, oyster-shell lime, native grapes,
pyritous earth, &c. - - - 97, &c.
- Agricultural Society; specimen of the mode of collecting
facts in one; and advantages of
such collections, - 232, 3, 4, 5
- Alderney cow; account of one, - - - 155
- Apple; Gloucester white, its excellence for cider, - 49

B

- Bacon, W. D. oats sown with seed wheat, invite the fly, 219
- Barclay, Robert, of England; his letters on American
ploughs, tares, cole-seed, &c. - 162, 3
- Bean, producing oil; culture recommended, - - 2
- Bennet's clover and turnip seeding machine, - - 44
- Betton, S. M. D. communication on sugar canes, - 120
- Brattle, William, Jr.; a large moth, the parent of the cut-
worm or corn-grub, - - 223

C

- Carrots, crops of, raised in Connecticut, - - 114
- Cattle, on salt water beaches require less drink, than
those on upland, - - - 276
-  There is a most deplorable deficiency of information in our volumes, on the subject of breeding and managing cattle, and other stock on our farms. It is to be earnestly wished, that our correspondents will enable us, hereafter, to supply this lamentable hiatus, in one of the most important branches of rural economy. R. P.
- Chondrometer; for weighing grains and grass seeds, - 312

Cicada septendecim, the true appellation of our locusts,	76
Clay; burning for manure, - - - - -	291
Cleaveland, Parker; his letter on the season of 1816; and other important subjects,	192, 3, 4
Clover seed; Bennet's machine for sowing, - -	44
and plaster husbandry, its great advantages,	228
 The practice of ploughing in clover, and using plaster, has arrived, in some counties of Virginia, to such perfection, as nearly to supersede the necessity for dung. R. P.	
Cockchaffer; some account of it, - - - - -	128
Coates, John R. his communications on salt marsh, and modes of cultivating, improving, and reclaiming it, - 257 to 285, inclusive	
Comstock, Dr. Joseph; culture of wheat and other crops, on land manured with sea-grass,	74
Corn, Indian; culture of it, - - - - -	166
grows luxuriantly on ground liable to stunt or sedge wheat, - - - - -	20
see Mr. Singleton's mode of culture, -	243
Coxe, W. his account of Gloucester white apple, -	50
Henry, on cut-worms, wild birds, Jones's wheat, &c. - - - - -	204, 5, 6
Note thereon, - - - - -	206, 7
Cow, Alderney; account of one, - - - - -	155
Cut-worms: holes near corn-hills trap them, -	221
destroy clover, - - - - -	ib.
caught in deep furrows, - - - - -	ib.
a large moth is their parent, - - - - -	223, 6
instance of pertinacious industry to destroy them, - - - - -	231

D

Dearborn, H. S. his account of the woad plant, - -	57
Draveil plough, improved; account of it, - - -	169

E

Eastburn, James; on the improved Draveil plough, -	169
Fall ploughing; accounts of it, pro and con, 232, 3, 4, 5	

Fig trees ; burying them, a guard against frosts, -	103
Fidler, a shell-fish, account of it, - - - -	268
Fire on soils ; burning wild vegetation of salt marsh, beneficial, - - - - -	255
but too deep burning injurious, - -	282
 The ashes of such overburnt surface are wasted and useless ; having no mould, mixed with inert vegetable matter, to work on. But see the important uses and value of <i>peat</i> , or <i>Dutch ashes</i> , when properly applied ; in Sir J. Sinclair's Tour through Flanders, 1815. R. P.	
Fisher, Miers ; on the paper mulberry, &c. - - -	86
Foreman, T. M. on big rye, and the oil bean, - -	1, 2

G

Gardner, John ; on the Hessian fly, corn grubs, &c.	195, 6
Garrigues, Abraham M. trial of Towsley's plough, culture of Indian corn, turnips, &c. -	168
Gibbons, Joseph ; Hessian fly, corn grubs, &c. -	200, 1
Grain moth ; some account of it, - - - -	236
Grain ; frequent successions of the same kind, injurious,	274
Grains and grass seeds ; weights of, - - - -	314
Grape vines ; hop vine planted near them, repels insects. Query, if it be not the effluvia from the hop ? See Vol. III. 366. - - -	84, 5
culture of grape vines in Pennsylvania not encouraging, - - - - -	102, 3
burying vines protects from frosts, -	<i>ib.</i>
Grub, black ; curious mode of banishing or destroying it,	189
corn ; preservatives of corn from its ravages, -	195
Note respecting it, - - - -	196, 7
burning wild grass destroys it ; and note thereon, - - - - -	198, 9—200
listing, a preservative, - - - -	199
mode of making holes as traps, by pins or cogs, on the rim of a wheel, - -	202, 3

Gypsum; - - - - -	115
extraordinary effects on corn and wheat, in Loudon county, Virginia, - - -	227, 8

H

Haines, Reuben; his communication of a mode of steam- ing potatoes, &c. - - - -	68
Harrows; account of several kinds, - - -	186, 7, 8
more useful to corn crops than the plough, -	243
Hay; chaffing, its advantages, -	104, 5. 107, 8, 9. 110, 11, 12
Hazard, S. samples of foreign grain presented by him, -	52
Hessian fly; - - - -	195, 216, 219, 224, 236, 213
Herd grass; most successful on wet soils; salt marsh par- ticularly, - - - -	273
Hop vine; planted near grape vine repels insects, -	84, 5
see vol. 3d. 366, effects of effluvia or scents.	
Horse rake; utility of, by Roberts Vaux, - - -	71
Horse shoes, or King crabs; food for hogs, - - -	275
Hosack, D. M. D. respecting salt marsh, - - -	249
Hoven cattle; Dr. Monroe's elastic tubes for relieving them, - - - -	55
But see vol. 2d. 41, et seq. a more expedi- tious and certain mode is mentioned, which experience has proved to be safe.	
Humphreys, Gen. D. effects of season of 1816, - - -	113



HORTICULTURE: Is mentioned, not for reference, but most serious regret. No communications appear in our volumes on this subject. And yet the management of a **KITCHEN GARDEN**, as it is called, is of the first importance to every farmer; and is most lamentably neglected. Few of our farmers sufficiently attend to their gardens; and too many neglect them entirely. If more vegetable food, and less flesh, were consumed on our farms, the more health and comfort would be the results. Nor would economy, in our domestic affairs, be found the smallest consideration.

The cheap luxury of garden fruits and vegetables, the innocent employment of time, and the health insured by them, ought to be incentives to a most careful and intelligent attention to their culture. R. P.

I & J

- Jefferson, T. his letter on the advantages of the hill-side
 plough, in mountainous countries, - - 16
 his account of the Gloucester white apple, 49, 50
 Indian corn ; on preserving it from frosts, - - - 63
 modes of cultivation, - - - - 184
 culture, in Loudon county, Virginia, - 227
 Inquiries, submitted to agricultural citizens, - 305, &c.
 Jersey manure ; extraordinary instance of efficacy after
 lying torpid a long time, and its congeniality with lime, - - - - 230
 Jones, I. C. on hay and straw cutting, or chaffing ; - 107
 on mangel wurtzel, - - - - 285, 286, 7
 Richard ; on Hessian fly, sledged wheat, steeping
 seed grain, &c. and note thereon, - 211, 215

K

- King crabs ; food for swine, on our coasts, - - - 275
 Kirk, Caleb ; his account of an uncommonly fertile soil,
 and trimming his thorn hedges, - - - 82, 3

L

- Lime kilns, Spanish ; economical use of fuel therein, - 9, 10
 Locusts ; improperly named by us ; they being the *cicada septendecim* of entomologists, and not the destructive eastern *gryllus*, - - - - 225
 Logan, G. his account of Bennet's machine for sowing
 small seeds, - - - - - 44
 Loudon county, Virginia ; improvement of their lands,
 by clover and plaster husbandry, - 227
 In some of our southern states, there is a
 practice called *enclosing* ; *i. e.* sowing clover,
 plastered frequently, and suffered to grow and
 re-seed itself, and rot down for two or three

seasons or years. Not a hoof nor a tooth is admitted. It is finally ploughed in, and fertilizes almost incredibly. This practice requires extensive farms; so that fields can, without inconvenience, lie out of demand during the time of melioration. R. P.

- Love, John; on Hessian fly, Lawler wheat, cut worm, &c. 208
 Lloyd, John; his communication to the late B. M'Mahon,
 on the culture and uses of mangel wurtzel, 151

M

- Morris, Anthony; letter on Spanish peasantry, &c. - 9
 Mease, J. M. D. communication, Gloucester white apple, - 49
 mildew and smut, - - - - 76
 hop vine near grape, - - - - 84
 burning clay for manure, - - - 291
 Monroe, Dr. elastic tubes for relieving hoven cattle, - 55
 Morey, S. New Hampshire; preserving Indian corn from
 frosts, - - - - - 63
 Mildew and smut; modes of preventing, - - - 76
 Mulberry, paper; quick growth, and its uses, - - 86
 Mangel wurtzel; culture and uses, - 104, 5, 6. 109. 286, 7. 151
 see appendix to 3d. vol. 99.
 Maris, Richard; account of an Alderney cow, - - 155
 Mitchell, S. L. M. D. on the season of 1816, - - 127
 Muck, or fresh dung; preference to rotted, 172, et seq.
 note thereon, - - - - 181
 Meade, R. K. harrows, Hessian fly, cut worms, Jones's
 wheat, &c. - - - - 195, 216
 M'Fadgen, James; Hessian fly, cut worms, &c. - - 220
 Mildew; grain on salt marsh little subject to it: salt wa-
 ter dashed on sails prevents, - - - 271
 Marshes; unhealthfulness endeavoured to be accounted for; 276
 salt; modes of reclaiming and improving,
 250 to 285, inclusive

N

- Noland, W. his letter on culture of wheat, by PLASTER
 and CLOVER husbandry, - - - 226

☞ See Mr. Noland's account of improvements by means of plaster and clover, in Loudon county, 2d. vol. *Memoirs: Inquiries on plaster*, 121.

The facts stated by Mr. N. do not rest on his single authority; which would, however, be sufficient. They appear extraordinary to those who exclusively rely on stable dung, and other costly manures; but are familiar to good farmers in Loudon, and some adjacent counties; who, first from necessity, and now from conviction fixed by experience, generally adopt this practice, and consider *dung* the least valuable manure. *Lime* they could have in plenty, if they did not prefer the plaster, and its great auxiliary, clover, ploughed in as green manure. Although the crops mentioned are not common, yet they have been produced. Twenty to twenty-five bushels of wheat, and forty bushels of corn, per acre, are average crops *now*, on many farms, on lands which, before this style of husbandry was introduced, would not yield one-third of their present product. These are good average crops in this country, wherein our grain ripens early, owing to the plant growing more rapidly; and, of course, giving less time for multiplying and maturing its seeds. The more feeble sun, and tardy progress of vegetation, in many parts of *Europe*, give advantages in quantity of crop, but not in quantity or quality of flour, in equal weights of wheat; there being more *offal* in European grain.

Dung, lime, &c. from habit, are primary desiderata with us. But let us cast the film from our eyes; and if we will not entirely substitute *burnt clay*, *mixing soils*, ploughing in *green manures*, rendered powerful by *plaster*; let us, at least, use them in aid of our favourites from old acquaintance; and give them a fair competition; to enable us to form a candid decision. Not to throw the least reflection upon the common mode of fertilizing by dung; it can truly be said, that its extent and duration are very limited; whilst the materials here mentioned, either as substitutes or auxiliaries, are in boundless plenty, and readily obtained. R. P.

O

Oyster shells ; used as manure, - - - - - 100

P

Parker, I. account of sedge wheat, change of seed, &c.
 and note, - - - - - 19, 25.
 wine made from cyder and honey, - - - - - 65

Peasantry, Spanish ; their character and habits, - - - 9

Patterson, John ; his ideas on the qualities of gypsum, 115, et seq.

 It often, of late years, occurs, that *plaster* does not operate the first season, when spread in the spring. I have repeated the dressing, one bushel to the acre, or two at most, after cutting the first crop of grass, to great advantage ; and have perceived its efficacy the succeeding year.

R. P.

Peat ; its great plenty on our salt marshes, - - - - - 261

 See our almanac for 1817. No better manure need be sought for, than the *ashes* of this *peat*. See Sir J. Sinclair's account of *Dutch ashes*, in his tour through Flanders. *Peat* composted and rotted is in itself highly fertilizing. Plaster accelerates its putrefaction. With a small proportion of stable dung, to promote more rapid fermentation, it is still more efficacious. R. P.

Peters, Richard ; on ploughs, mangel wurtzel, fall-ploughing, &c. - - - - - 13, 89

 benefits derived from chaffing hay, - - - 104, 5

Richard, jun. on Hotchkiss's straw cutter, - - - 118

Richard ; sen. wire fence, oats, Jersey manure, &c. 229

 communication of his correspondence on salt marsh, - - - 248

 correction of error, in his Notices for a young farmer, - - - 316

Plater, T. account of stunt or sedge-wheat, - - - 125

Poole, William ; burning wood grass kills cut worms, 198

Plough, Hill-side ; Mr. Jefferson and col. Randolph's account of one, - - - - - 16, 18

Ploughs, American; sent to England, trials of them,	13, 160, 1, 3, 4
Towsley's; trial of it, - - - -	165
Draveil; improved, and its advantages, -	169
Ploughing, fall; its advantages, - - -	89, 99, 220
Potatoes; apparatus for boiling by steam, - - -	68
Preston, S. account of stunt in timothy grass, and mode of destroying garden grubs, - - -	189
periodical freshets in Delaware and N. E. branch of Susquehanna, - - -	140
navigation of Susquehanna and Delaware ri- vers, - - - -	145

R

Rake, Horse; - - - - -	71
Redman, T. discovery of hop vine repelling insects from grape, - - - - -	84
Randolph, Col. description of a hill-side plough, with a model, - - - - -	19
Ridgeley, N. account of treading and getting out wheat by a roller, - - - - -	29
Rye, big; or Tangier wheat, cultivation in Maryland,	1, 2
Rye, common; thrives on newly cleared salt marsh bet- ter than wheat, - - - -	272

S

Salt marshes; reclaiming, improving, and cultivating, and general description, 248 to 285, inclusive	
Sea-shore inhabitants; habits of some, to be taken into the account in calculations of expense of im- proving salt marshes, - - - -	274
Say, Thomas; entomological letters, - - -	224, 236
Sedge wheat; insects or worms found in the roots, and an account of its mischiefs, - - -	213
Season of 1816; its effects on crops, &c. 95, 96, 113, 14, 115, 123, 124, 130, 127, 156, 190, 192, 3, 4, 208, 213, 216, 220	
Shee, Parke; trapping corn grubs, in holes made by pins on the rim of a wheel, - - - -	202, 3

Shell-marle; great improvement by it, - - -	238
Singleton, John, of Maryland; great improvement by means of shell-marle, - - -	<i>ib.</i>
Smyrna, in Turkey; kinds of wheat cultivated and brought for sale in the ports of the Mediter- ranean, modes of manufacturing, &c. -	51, 53
Soil; one uncommonly fertile without manure, - -	82
Stunt, or sedge wheat; I. Parker's, T. Plater's account of it, - - - - -	19, 47, 125
Stoves, Spanish; for economical cooking, - - -	9
Sugar canes; communication respecting them, - -	120
Swartwout, John & Brothers; on salt marsh and improve- ment on reclaimed marsh, - -	250, 256
Steeping seed wheat; - - - - -	212

T

Tares, cole seed, mangel wurtzel, &c. - - -	162
Treading or getting out wheat by a roller, - - -	29
Turnips; apparatus for steaming, - - -	68
culture of them, - - - - -	167
Turkey; substitutes for hay in that country, and wheats cultivated and sold there, - - -	54

V

Vaux, Roberts; his account of the utility of horse rakes, -	71
---	----

W

Water, fresh; how to procure it in salt marshes, -	266
 On the shores of the <i>Isle of May</i> , where salt peculiarly abounds, a headless hogshhead, sunk in the sand, affords a sufficient depth to collect fresh water. Salt water percolates, through the sand, into this receptacle, and becomes fresh by filtration. This fact has been noticed there, at a time when no rain had fallen during a period of two or three years precedently. R. P. salt; dashed on sails prevents their becoming mildewed, - - - - -	271

Weeds, fresh ; spontaneous growth, after desiccating salt marsh,	- - - - -	281
see vol. 1st. changes of timber and plants, pages, 28, 296		
White & Hazard ; wire fences,	- - - - -	3, 4, &c.
Wire fences ; calculation of cost, and uses,	- - - - -	3, 4, &c.
account of one,	- - - - -	229
Wine ; made from cider and honey,	- - - - -	65
Wheat, sedge ; I. Parker's account of it, and efficacy of change of seed, and note by R. Peters,	19, 25, 21, 22	
threshing or detaching by a roller,	- - - - -	29, et seq.
samples of foreign wheats, account of them, by S. Hazard,	- - - - -	52
manure for it, seaweed or grass from sea coasts,	- - - - -	74
Tangier ; called big rye, account of it,	- - - - -	122, 3
Lawler, or Jones's, said to withstand the Hessian fly,	- - - - -	208
blue straw, otherwise, but flourishes in ground where other wheats stunt,	- - - - -	211
advantages of rolling in plaster,	- - - - -	212
plaster and ploughing in clover highly beneficial for wheat and Indian corn,	- - - - -	228
red chaff ; thrives better than white, in salt marsh,	- - - - -	271
weights of ; English and American ; also of other grains and grasses,	- - - - -	314, 15
Woad plant ; H. S. Dearborn's account of its culture and uses,	- - - - -	57

ERRATA, IN THE MEMOIRS.

- Page 1. For "comprising," *read* comparing.
18. For "not plated," *read* plated.
27. For "facts stated by Mr. Parker," *read* fact.
38. For "two tedious," *read* too tedious.
57. For "Dearbrn," *read* Dearborn.
62. For "annels of nation," *read* annals of nations.
63. For "I thought could," *read* I thought I could.
76. For "must," *read* smut.
81. For "dnd," *read* and.
89. For "destrction," *read* destruction.
89. Insert a period after "fall of the year."
97. For "*lime shells*," *read* oyster shells.
114. For "horticulturlists," *read* horticulturists.
115. For "Sir Humphery," *read* Sir Humphrey.
182. In the Note. For "the hot dung," *read* the dung.
189. For "will kill them," *read* will kill most of them.
251. For "perpendicular to the dyke," *read* at right angles
towards the dyke.

A note, after Mr. Singleton's communication on the use of shell marle, should have been added.

Mr. *Singleton* is unable accurately to ascertain the average annual acreable amount of his crops. But his land having produced twenty bushels of wheat, on corn ground, and forty bushels of Indian corn, per acre, and being now in a state of progressive improvement, he thinks it safe to state those quantities as average crops; liable to deductions, as are all crops, by uncontrollable casualties.

W. T.

The following communication was made too late to be inserted in the body of our volume. It is too valuable to be omitted ; and is added, by direction of the Society.

Philadelphia, Sept. 13, 1818.

Dear Sir,

Knowing the active interest you take in the progress of American agriculture, I am persuaded you will receive with some degree of satisfaction the two following observations, which I had occasion to make, in my last ramble through Pennsylvania and New Jersey. They may be of some utility in future times ; and perhaps you may think that they deserve being proposed, as objects of experiment and inquiry, to the zealous members of our Society.

It is useless to recall the importance of having useful plants fit for every kind of soil, chiefly for the least fertile ; it is useless also to recall the importance of the vegetables that feed the cattle, in every system of husbandry. I will only demand your attention to the immense quantity of sandy soil, that occupies all your coast, from the Neversink highlands to St. Mary's, more than seven hundred miles in length, and a medium breadth of sixty miles. In all this wide-extended tract, the excellent system of husbandry, founded on plaster and clover, is

scarcely practicable ; and the means of feeding cattle diminish, in proportion as the necessity of animal manure increases.

In this last ramble, I have met with a variety of the grass called by the botanists *Panicum Virgatum*, growing in the most luxuriant manner, in bushes, in the sandy soils about Shrewsbury river, New Jersey. The horses and cows, to which it was presented, ate it with great greediness ; and in fact, the only bushes of this grass that were untouched, were those placed within fences. I have recommended to Mr. Rosevelt, a very intelligent farmer at Plack Point, to collect seeds for me ; and he himself was persuaded to try the cultivation of it in the sandy parts of his farm.

The other observation is on mulberry trees. From the beginning of the seventeenth century, and first establishment of Virginia, the rearing of silk worms has been in contemplation ; but the attempts have been unsuccessful,—not from any defect of the country, but for want of population, this object of culture being only practicable where many hands can be spared from more necessary labours. The Moravians in Bethlehem, (Pa.) planted, with the same view, many European white mulberry trees ; but have abandoned the rearing of silk-worms, from the above mentioned general cause. The trees, left to themselves, grow luxuriantly, intermixed with the American *morus rubra*, a native of America, and very common in the interior of Pennsylvania. It has happened that they have formed alliances, an event not rare in the vegetable kingdom, among plants of the same genus, and the production is a mixed breed mulberry tree, with the leaves shaped like the American species, but all the

rest of the nature of the European. This mixed breed appears fitter than any of the parents to feed the silk worms, bearing more succulent and tender leaves, and less rough than either of the parents.

These two observations you may announce to our society: if they judge them worthy of notice, I will try to expose them in more detail, and in a form more appropriate to appear in their Memoirs. In the mean time, receive the assurance of the consideration and esteem with which I am,

Most faithfully, Yours,

J. CORREA DE SERRA.

DR. JAMES MEASE.

*Jethro Wood's Improved Patent Cast-Iron Plough.**(See Plate.)*

The mould-plate, share, and land-side of this plough are cast-iron. The mould-plate is of a superior construction ; it combines the mechanical principles of the *wedge* and *screw*, in raising and inverting the furrow-slice. The share is attached to the mould-plate by screws; the beam is also raised and lowered by a screw ; and a wrench, for the purpose of raising and lowering the beam, and also for taking off and putting on the shares, serves as a bolt for the clevis.

Ploughs upon this principle are made and sold by

JOSEPH BARNARD & SON,

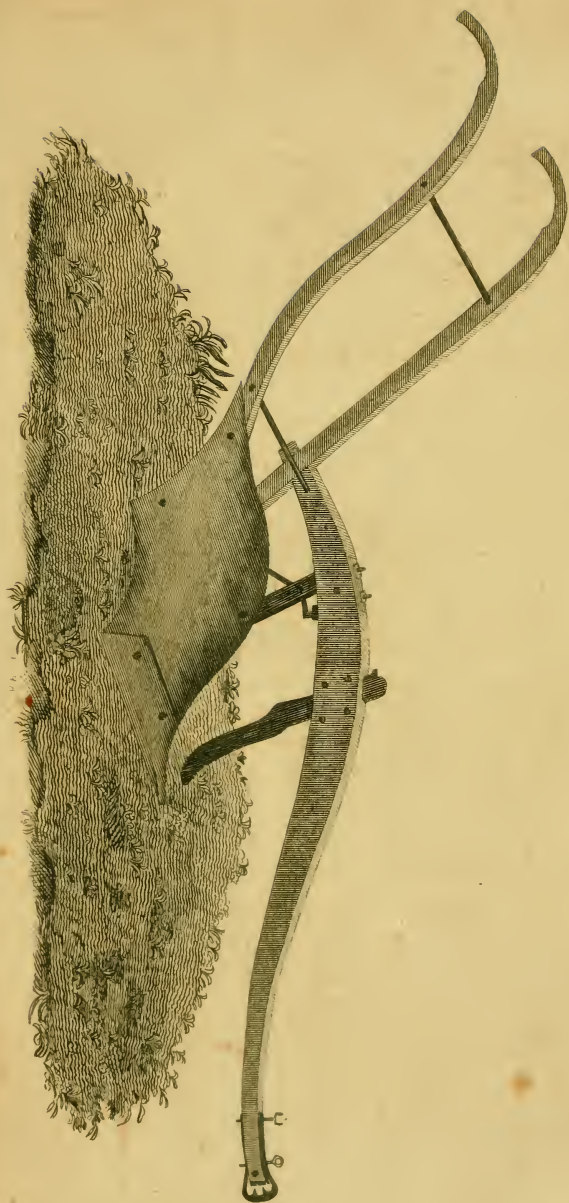
*Market street, between Schuylkill Third and Fourth streets,
Philadelphia.*

J. B. & Son endeavour to unite beauty with utility in their ploughs, and they warrant them to answer the purpose for which they are designed, in every respect. In consequence of the peculiar shape of the mould-plate, it escapes, in a great measure, that friction to which all ploughs are subject in raising the sod or furrow-slice ; it is therefore easier in the draught than any other plough now in use.

The cast shares are furnished at sixty cents each, and are warranted not to break, even in the most stony soil. Wrought shares can be furnished, if required, at two dollars each ; and if necessary, the coulter can be connected with the point of the share.

Scientific and practical farmers are respectfully invited to call and examine the plough, and, if they please, give them a trial, and if they do not answer their purpose, return them.

 All orders promptly executed.





CORRIGENDA.

No. VI. Table of Contents, for *line* fences, read *live* fences.

No. II. page vi, in the note, for *heretofore*, read *theretofore*.

No. IV. page x, near end of paragraph, for "before it, (the seed corn,) starts," read *sprouts*.

At the end of the second paragraph, page x, add

Transplanting, from a seed bed, sown early, broad cast, in or convenient to your corn field, or with supernumerary plants, from other hills, is far preferable to using seed corn for supplying defective hills, cut off by the grub, or otherwise vacant. *Plants* overtake and keep pace with those uninjured; but renewals with seed corn, seldom arrive at maturity.

Salt is used for destroying grubs, worms, &c.; and has been successful in killing, or banishing the *corn grub*. *Old pickle*, or refuse meat, or fish, dispersed in small quantities, in mole tracks, has banished moles from gardens, or fields.

At the end of the last paragraph,—

Indian corn is truly a great exhauster; however valuable it may otherwise be. It should therefore be only *one* of a course of crops, and not repeated, but at long intervals. When its turn arrives, it should be used as a *cleaning crop*; for which it is highly estimable, not only for its own, but for the benefit of its successors; which should be small grains and grasses. Whatever may be done in more fertile or new countries, old lands will not admit of frequent and uninterrupted successions of this crop.

No. V. page xiii. Insert after "or stable manure,"—It is a mistake to suppose that dung sinks into the earth. It evaporates; and its salts and gases mix with the air. Superficial applications may serve a turn for a crop or two; but the ground is not durably benefited.

No. XIII. page xxvi. The following was accidentally omitted in the copy;—

Nothing requires more attention to the nature and qualities of your soil, than the use of *lime*. If it be too lavishly applied, or too frequently repeated, without intervals of grass to furnish vegetable matter; or manures, either animal or vegetable, ploughed in, for the *lime*, (according to the country phraseology,) to feed on; it renders your ground *lime sick*; and reduces it to sterility. Our caustic lime must be applied in quantities very far less than the *mild lime* of Europe, if we would avoid turning a highly beneficial auxiliary, into a destructive scourge. No certain rules, as to quantity per acre, can be fixed, without a perfect knowledge of the soil to which it is to be applied. In all cases, moderate quantities, at first, are the safest. Our common lime is here meant; as much depends on the kind of lime applied. It must therefore be the study of those who apply lime, to discover its composition, or what is called its strength; before they can form a correct opinion of its salutary

Corrigenda.

or injurious uses. It would seem, that the *mild lime* had some fertilizing qualities *in itself*; otherwise the lavish use of it, whereof we read, cannot be accounted for. The lime of *burnt oyster shells* is *mild*; and land of any tolerable staple will bear great quantities, beyond the proper allowance, to the acre, of caustic lime. See Mr. *Adlum's* letter, page 100, of the fourth volume. Many other instances might be adduced. Both large and small quantities operate at once. But it is fugacious; and, compared with caustic lime, soon exhausted. Of the mild lime of *England*, seven hundred bushels have been put on an acre: and two hundred bushels are common. What is the strength of their mild lime, compared with oyster shell lime, or with our magnesian or caustic lime, is unknown. Forty to sixty bushels of the latter, are amply sufficient, with us, for any worn acre: and for most of our worn land, too much; at the first dressing. What quantity of oyster shell lime is proper at first, is not yet ascertained. Repetitions of smaller quantities, at intervals, would be better, than applications of too much, at once.

Mere practical results being here intended, you must consult books, for technical and copious discussions on lime.

No. XIV. page xxvi. After "renovating orchards by crossing," strike out the words "from seeds of," and insert, by applying the pollen of one kind to the pistil of another.

No. XVI. page xxx. After "forced on the people of Europe by necessity," insert, *Salt* your clover and other succulent as well as coarse hay. But *over* salting diminishes the nutriment. More than a peck to a ton is superfluous. Half that quantity is often sufficient. Ten to fifteen pounds is usually an ample allowance.

No. XX. page xxxvii. At the end of the fourth paragraph, after "great attention," add—

A principle of adaptation of animals, as well as plants, to soil, climate, and situation, will be found in nature; with rare exceptions. The various species of *sheep* prove this principle. Dry countries are best, for *all*; as they require little drink, and wet soils produce diseases. Yet fenny countries, and coarse bites (especially if salt,) are favourable to some kinds. The Lincolnshire and long wooled, will thrive in such situations, and with such feed, where fine fleeced sheep would perish or degenerate. In our zeal for fine wooled sheep, we overlooked this principle; and believed that any pastures would suit them. The *Cheviot* sheep delight in mountainous ranges, often covered with snow; and the *Shetland* race in short bites, salt air, and barren browsing; yet the fleeces of the latter are finer, though scanty, than those of the *Merino*. Instances of other animals might be adduced. Old pastures, dry and elevated, are best for sheep; and preferable to artificial grasses. Of such grasses, Mr. *Coke*, of Norfolk, in *England*, finds the *cocksfoot*, (our orchard grass,) constantly fed, the most eligible. He *inoculates* a clean fallow field with sods

Corrigenda.

of old lay, three inches square, and the same distance apart, to renovate old pasture; so valuable is it deemed. His fields are well cleaned, by his row-culture; which he extensively and profitably practices. New countries produce no proper pastures, *generally*, for fine fleeced sheep; though there may be selected spots. The sheep for such countries, should be those of the heavy fleeced and long wooled breeds. *Prairie* countries, it would seem, are peculiarly calculated for them.

Household manufactures are of the first importance; and *practical farmers* should breed heavy fleeced and worsted or long wooled sheep, for common purposes, in such manufactures, as well as for marketable carcasses; even in old settlements and districts of country. But for *any* flock, a better mode of providing their keep through the winter and spring months, must be introduced. Succulent food, consisting of *carrots*, *potatoes*, Swedish or other *turnips*, *Mangel Wurtzel*, &c. must be provided. Sheep out of condition are most worthless stock. Wool nor mutton can no more be produced from a starved flock, than can a profitable crop be gathered, from a steril and ill cultivated field. No question is intended to be discussed on the subjects of large manufacturing establishments, or fine wooled sheep. Enough, both of experience and discussion, has already been exhibited, to enable every one to form his own opinion. Under prudent and intelligent direction, both of these great subjects of public prosperity will settle down to their proper standard; and where *that* is exactly to be found, only *time* and *experience*, faithful and unerring monitors, can, with any precision, determine. See Vol. III. Philad. Agric. Memoirs, pages 362, et seq.

✎ Errors in grammar or punctuation, not noticed, are left for correction to candid readers.

The few books enumerated are mentioned, (their titles from memory,) because they are written in our language, in addition to their intrinsic value. The leisure of a young farmer, fond of mental improvement, could not be better employed, than in qualifying himself to read agricultural, and other publications relating to his art, written in other living languages. The French and German, particularly, are highly useful for intercourse with foreigners, arriving or being in our country. In these languages he would find stores of information, well worthy his profitable labour in acquiring them.











